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ATTORNEY DOCKET NUMBER: 2002834-0043 (CIP4)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Appellant: Bannon, et al. Examiner: Huynh, P.  
Serial No.: 09/141,220 Art Unit: 1644  
Filed: August 27, 1998  
For: METHODS AND REAGENTS FOR DECREASING CLINICAL REACTIONS TO ALLERGY

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**AMENDED APPEAL BRIEF UNDER 37 C.F.R. § 1.192**

Appellant appeals to the Board of Patent Appeals and Interferences (the "Board") from the Examiner's rejection of claims 37-54 and 57-62. A Notice to this effect was filed pursuant to 37 C.F.R. § 1.191(a) on December 5, 2003. The Advisory Action mailed January 6, 2004 indicates that the Notice was received by the Patent and Trademark Office on December 8, 2003. An original Appeal Brief (the "Original Brief") was filed on July 8, 2004 along with a Petition under 37 C.F.R. § 1.136 for a five (5) month extension of time, from February 8, 2004, up to and including July 8, 2004. That filing also included checks to cover the \$1005.00 fee under 37 C.F.R. § 1.17(a)(5) for the Petition and the \$165.00 fee under 37 C.F.R. § 1.17(c) for the Appeal Brief.

A Notification of Non-Compliance with 37 C.F.R. § 1.192(c) was mailed by the Patent Office on September 22, 2004. Applicant is hereby filing an amended Appeal Brief (the "Amended Brief") that corrects the items identified in the Notification. Since the Original Brief was filed before September 13, 2004 when the new rules under 37 C.F.R. § 41.37(c) came into effect it is Applicant's understanding that this Amended Brief need only comply with the requirements of 37 C.F.R. § 1.192. Pursuant to 37 C.F.R. § 1.192(a), this Amended Brief is being filed in triplicate. A Petition under 37 C.F.R. § 1.136 for a one (1) month extension of time, from October 22, 2004, up to and including November 22, 2004 is also enclosed with a check to cover the \$55.00 fee under 37 C.F.R. § 1.17(a)(1). Please charge any additional fees, to our Deposit Account 03-1721.

### **Real Parties in Interest**

As a result of assignments by the inventors, the real parties in interest in this application are the University of Arkansas ("UArk"), SEER Pharmaceuticals LLC (f/k/a Panacea Pharmaceuticals, LLC), and the Mt. Sinai School of Medicine of the City University of New York ("Mt Sinai"). An assignment from inventors Garry Bannon and Wesley Burks to UArk was recorded in the Patent and Trademark Office on April 23, 1999 at Reel 010065, Frame 0008. An assignment from inventor Howard Sosin to Panacea Pharmaceuticals, LLC was recorded in the Patent and Trademark Office on August 26, 1999 at Reel 010190, Frame 0516. A Certificate of Amendment changing the name of Panacea Pharmaceuticals, LLC to SEER Pharmaceuticals, LLC was filed with the Secretary of State of the State of Delaware on October 25, 2002. A copy of this Certificate was filed for recordation with the Patent and Trademark Office on October 16, 2003. An assignment from inventor Hugh Sampson to Mt Sinai was recorded in the Patent and Trademark Office on October 22, 1998 at Reel 009539, Frame 0550.

### **Related Appeals and Interferences**

Appellant has filed Appeal Briefs for co-pending applications U.S. Serial No. 09/455,294; U.S. Serial No. 09/478,668; U.S. Serial No. 09/494,096; and U.S. Serial No. 09/731,375 addressing some issues that overlap with the issues presented here. No other pending appeals or interferences are known to Appellant, Appellant's legal representative, or Appellant's assignee that will directly affect or be directly affected by the Board's decision in this appeal. Similarly, no other pending appeals or interferences are known that may have a bearing on the Board's decision in this appeal.

### **Status of Claims**

The application was filed with claims 1-36. Claims 1-36 were the subject of a Restriction Requirement mailed June 22, 1999; claims 1-13 were elected. Claims 1-13 were examined in an Office Action mailed April 11, 2000. Claims 14-36 were canceled in an Amendment filed September 11, 2000; claim 8 was amended. Claims 1-13 were canceled in an Amendment filed August 22, 2002; claims 37-62 were added. Claims 37-62 were finally rejected in an Office Action mailed October 3, 2003. A Notice appealing the rejection of claims 37-62 was filed December 5, 2003. An Amendment canceling claims 55-56 and amending claims 57-62 was filed with the Notice. An Advisory Action was mailed January 2, 2004 indicating that the Amendment had been entered. Thus, claims 37-54 and 57-62 are pending and stand rejected. The rejection of claims 37-54 and 57-

62 is hereby appealed. A listing of pending claims 37-54 and 57-62 is provided as **Attachment I**.

### **Status of Amendments**

An Amendment was filed with the Original Brief that amended independent claims 37 and 52 to clarify that the modified allergen is derived from a natural allergen. This Amendment also amended claim 43 in order to clarify its scope, in particular to clarify that the portion of the allergen includes all of the one or more IgE binding sites of the natural allergen. An Advisory Action mailed by the Patent Office on September 20, 2004 indicated that this Amendment would not be entered. Thus the pending claim remain as listed in **Attachment I**.

### **Summary of Invention**

The present invention is directed to a method of preparing modified protein allergens that have a reduced ability to bind IgE antibodies (page 4, lines 2-14). The modified protein allergens are useful in treating allergies and in particular anaphylactic allergies (page 5, lines 5-9 and page 7, line 15 to page 9, line 15). The modified protein allergens are prepared by identifying one or more IgE binding sites in a natural protein allergen; modifying the protein allergen by mutating at least one amino acid in one or more IgE binding sites; screening for IgE binding to the modified protein allergen using serum IgE from an individual that is allergic to the protein allergen; and selecting the modified protein allergens which have decreased binding to IgE as compared to the unmodified protein allergen (page 7, lines 16-25; page 9, line 16 to page 12, line 7 and page 16, line 4 to page 29, line 23). Claims 52-54 and 57-62 recite methods of preparing modified *food* allergens (page 7, line 26 to page 8, line 16). The present specification includes data and working examples demonstrating the method as applied to peanut allergens Ara h 1, Ara h 2 and Ara h 3 (see Examples 1-2 on pages 16-27). *In vitro* (see Examples 3-4 on page 28) and *in vivo* (see Example 5 on page 29) experiments that were performed with a modified Ara h 2 protein are also discussed. The specification also describes other known protein allergens, including a range of food allergens, that can be modified according to the methods of the invention (page 7, line 26 to page 8, line 16).

## **Issues**

The issues on appeal are (referring to §§ 4-20 of Office Action mailed October 3, 2003):

- (1) Are the pending claims invalid for lack of written description? Specifically, can the written description requirement ever be satisfied for claims relating to proteins without an explicit recitation in the specification of every sequence encompassed by the claims (§ 4)?
- (2) Are claims 57-61 invalid for containing new matter (§ 5)?
- (3) Are claims 37-39 indefinite for reciting the term “substantially” (§ 6)? Appellant notes that the term “substantially” is not used in claim 37. Thus the rejection presumably only applies to claims 38-39.
- (4) Are claims 37, 39-43, 46-47, 49-51 and 57-62 anticipated by Aki et al. (§ 9)?
- (5) Are claims 37-38, 41-43, 45-47, 49-51 and 57-62 anticipated by U.S. Pat. 5,547,669 (§ 10)?
- (6) Are claims 37, 40-43, 48-53 and 57-62 anticipated by Burks et al. (§ 12)?
- (7) Are claims 37, 40-43, 48-53 and 57-62 anticipated by Stanley et al. (§ 13)?
- (8) Are claims 37-38 and 49 obvious in light of Aki et al. and WO 94/11512 (§ 16)?
- (9) Are claims 37 and 44 obvious in light of Aki et al. and U.S. Pat. 6,207,646 (§ 17)?
- (10) Are claims 37, 48 and 52-54 obvious in light of Aki et al. in view of Burks et al., Stanley et al. or U.S. Pat. 5,449,669 (§ 18)?
- (11) Are claims 37, 39-40 and 44 obvious in light of U.S. Pat. 5,547,669 in view of Aki et al. and U.S. Pat. 6,207,646 (§ 19)?
- (12) Are claims 37, 48 and 52-54 obvious in light of U.S. Pat. 5,547,669 in view of Burks et al., Stanley et al. or U.S. Pat. 5,449,669 (§ 20)?

## **Grouping of Claims**

For ease of discussion, Appellant defines the following groups of claims (A)-(B):

- (A) Claims 37-51 and 57-62 as dependent from claim 37 that recite a method of making a modified protein allergen.
- (B) Claims 52-54 and 57-62 as dependent from claim 52 that recite a method of making a modified food allergen.

The claims stand or fall together for issues numbered (1)-(12) above, as indicated below:

(1) The claims of Group A stand or fall together and the claims of Group B stand or fall together.

(2) Claims 57-61 stand or fall together.

(3) Claim 37 stands or falls alone; claims 38-39 stand or fall together.

(4) Claims 37, 39-43, 46-47, 49-51 and 57-62 stand or fall together.

(5) Claims 37-38, 41-43, 45-47, 49-51 and 57-62 stand or fall together.

(6) Claims 37, 40-43, 48-53 and 57-62 stand or fall together.

(7) Claims 37, 40-43, 48-53 and 57-62 stand or fall together.

(8) Claims 37-38 and 49 stand or fall together.

(9) Claims 37 and 44 stand or fall together.

(10) Claims 37, 48 and 52-54 stand or fall together.

(11) Claims 37, 39-40 and 44 stand or fall together.

(12) Claims 37, 48 and 52-54 stand or fall together.

## **Argument**

### ***ISSUE 1: The pending claims are not invalid for lack of written description***

The pending claims stand rejected for lack of written description (see § 4 of Office Action mailed October 3, 2003). With respect to this rejection, the claims of Group A stand or fall together and the claims of Group B stand or fall together. By definition, claim groups that cover species of different scope require a separate written description and/or different levels of written description. Since claim groups A and B cover species of different scope (i.e., methods of making modified protein allergens vs. methods of making modified food allergens), these claim groups must be considered separately and stand or fall separately for purposes of this rejection. The written description requirements for claim Groups A and B are discussed separately below.

The written description requirement imposes a duty on patent Appellants to notify the public of the scope and content of their inventions. The requirement is satisfied if one skilled in the art would reasonably conclude that the inventors were in possession of the claimed invention at the time the patent application was filed. *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555 (Fed. Cir. 1991). Furthermore, there is a strong presumption that claims submitted with an application are adequately

described by the application. *In re Wertheim* 541 F.2d 257 (Fed. Cir. 1993). Claims 37-50 were present in substantially the same form as claims 1-13 in the application as originally filed. Claim 51 is a dependent claim that recites limitations found on page 4, lines 10-13 and page 9, line 17 to page 10, line 3 of the specification as filed. Claims 52-54 parallel the language of claim 37 and are of narrower scope (i.e., they are simply limited to food allergens that are described on page 8 and in the Examples). Claims 57-61 recite the limitations found in original claim 14 and the data of Table 6 of the specification as filed (see discussion under Issue 2 below). Claims 62 and 70 recite a limitation found in the section spanning pages 24-25 of the specification as filed. The burden is therefore on the Examiner to overcome the strong presumption of descriptive support with evidence or reasons why persons skilled in the art would not recognize in the disclosure a description of the invention defined by the claims. The Examiner has not, and cannot meet this burden; the claimed invention is appropriately described in the specification.

Both in her written rejections and in an in-person interview, the Examiner has indicated that, in her view, the written description requirement can never be satisfied for a claim that involves a nucleic acid or protein unless the complete sequence of every nucleic acid or protein to which the claim relates is explicitly set forth in the specification and recited in the claim by way of a SEQ ID NO. The same Examiner is responsible for the prosecution of a large number of related cases; we are unable to move prosecution forward without first resolving the question of whether the written description requirement can ever be satisfied without recitation of a SEQ ID NO. in the claim.

In the present case, the Examiner is taking the position that the written description cannot be satisfied for a *method of making* a modified protein allergen unless the sequence of every modified protein allergen that can be made by the method is recited. This is not the law. The legal standard for the written description requirement was most recently articulated in *University of Rochester v. G.D. Searle & Co.*, 358 F.3d 916 (Fed. Cir. 2004). In that case, the specification described the cloning of cyclooxygenase-2 (or “COX-2”) and methods of identifying selective inhibitors of COX-2. The *only* description of the inhibitors themselves consisted of the following two sentences (see column 27, lines 29-35 of U.S. Pat. No. 6,048,850):

“The compounds identified in the screen will demonstrate the ability to selectively modulate the expression of [COX-2]. These compounds include but are not limited to nucleic acid encoding [COX-2] and homologues, analogues, and deletions thereof, as well as antisense, ribozyme, triple helix, antibody, and polypeptide molecules and small inorganic molecules.”

The Patent Office issued claims to methods of selectively inhibiting COX-2 in a host by administration of such inhibitors (see claims 1-8 of U.S. Pat. No. 6,048,850). In *Rochester*, the court held that U.S. Pat. No. 6,048,850 did not include a written description of the selective inhibitors. *Id.* at 926-27. The court further held that methods of *using* the inhibitors could not be described without a written description of inhibitors and thus that the issued claims were invalid. *Id.* at 927. However, the court also held that methods of *identifying* the same inhibitors *were* adequately described and were therefore valid (these were claimed in U.S. Pat. No. 5,837,479). *Id.* at 928. Here, the pending method of *making* claims are most analogous to methods of *identifying*, not methods of *using*. Moreover, in the present case, the specification *does* contain extensive description of modified protein allergens that can be prepared according to the claimed methods. If the description was sufficient in *Rochester* then it must be adequate in the present case.

The absurdity of the Examiner's position is demonstrated by considering her rejection of the method of making modified peanut allergens that are explicitly exemplified in the specification. According to the Examiner, the written description is not satisfied in this case for *any* nucleotide molecules other than those encoding peanut allergens that have been modified by substitution with *alanine* or *methionine* at those *specific locations* listed in Tables 4, 5 and 6. This is clearly not the law nor should it be. The proper legal question is not "did Appellant *reduce to practice* and *explicitly recite* a method of making every modified peanut allergen that falls within the scope of the claims?" Instead, the question is "would a skilled person recognize that Appellant was in *possession* of the method of making modified peanut allergens that fall within the scope of the claims?"

The present specification sets forth the complete amino acid sequences of Ara h 1, 2, and 3 (SEQ ID NOs. 2, 4 and 6), and also the nucleotide sequences of genes that encode them (SEQ ID NOs. 1, 3 and 5). The specification further sets out the amino acid sequences of each of 23 IgE epitopes mapped in the Ara h 1 protein (Table 1), the amino acid sequence of each of 10 IgE epitopes mapped in the Ara h 2 protein (Table 2), and the amino acid sequence of each of 4 epitopes mapped in the Ara h 3 protein (Table 3). The specification further describes particular alanine or methionine substitutions that were introduced into the mapped IgE binding sites, and shows that some of these substitutions result in decreased IgE binding (Tables 4-6). In discussing these data, the specification states (see page 25, lines 11-23):

“The results discussed above for Ara h 1, Ara h 2, and Ara h 3 demonstrate that once an IgE binding site has been identified, it is possible to reduce IgE binding to this site by altering a single amino acid of the epitope. [...] Besides finding that many epitopes contained more than one residue critical for IgE binding, it was also determined that more than one residue type (ala or met) could be substituted at certain positions in an epitope with similar results. This allows for the design of a hypoallergenic protein that would be effective at blunting allergic reactions for a population of peanut sensitive individuals.”

Thus, the specification specifically highlights that substitutions at different positions, and with different amino acids, achieved comparable results.

The Examiner is correct that the specification does not explicitly set forth the sequences of *all* possible disruptions to Ara h 1, Ara h 2, and Ara h 3 IgE sites. However, a skilled person, reading the specification, would understand, indeed would explicitly be told, that the presented substitutions were merely exemplary and others would work as well. A skilled artisan would appreciate that the techniques described in the specification would successfully identify all such substitutions. That is, a skilled person would understand that the inventors were in *possession* of the invention to the full scope of the claims.

A claim limited to the particular substitutions that the inventors happened to have made prior to filing their patent application is virtually useless. Anybody of ordinary skill in the art could make a modified peanut allergen that falls outside the scope of such a claim but still embodies the spirit, scope, and teachings of Appellant’s contribution. If the legal standard of written description in fact required verbatim recitation of every possible useful sequence, as asserted by the Examiner, patent applicants would be forced to perform useless and wasteful experiments (potentially endlessly) merely to ensure that they could protect their contributions, or alternatively would be motivated to include endless lists of sequences in their patent applications merely to ensure that all contemplated embodiments are “described”. Such a result would have no beneficial purpose.

Turning to the specifically rejected claims, claim 52, the only independent claim in Group B, recites:

“A method of making a modified food allergen which is less reactive with IgE comprising:

(a) identifying one or more IgE binding sites in a food allergen, the one or more IgE binding sites being ones that are recognized when the food allergen is contacted with serum IgE from an individual that is allergic to the food allergen;

(b) modifying the food allergen by mutating at least one amino acid in one or more IgE binding sites;



- (c) screening for IgE binding to the modified food allergen using serum IgE from an individual that is allergic to the food allergen; and
- (d) selecting the modified food allergens which have decreased binding to IgE as compared to the unmodified food allergen.”

The specification explicitly sets out the sequence of several examples of methods of preparing modified peanut allergens. These modified peanut allergens are described as “exemplary” of the inventive principles. For example, the specification recites that “Peanut allergens (Ara h 1, Ara h 2, and Ara h 3) have been used in the examples to demonstrate alteration of IgE binding sites while retaining binding to IgG and activation of T cells” (page 4, lines 15-17). The specification also points to several other common food allergens (see page 8, lines 1-3: “Examples of common food allergens include proteins from peanuts, milk, grains such as wheat and barley, soybeans, eggs, fish, crustaceans, and mollusks.”). Moreover, the specification provides references for food allergens *whose IgE epitopes had already been* identified (see page 8, lines 4-13). The specification also describes techniques for modifying sequences within IgE sites (see, for example, page 10, lines 3-6 and Examples 2-3), and for identifying those modifications that reduce IgE binding (see, for example, page 4, lines 24-28 and Examples 1-2) in accordance with claim 52.

And, of course, the specification provides evidence that the inventive strategy successfully produced modified peanut allergens with reduced IgE reactivity. The teachings and guidance provided by this success are far-reaching. As discussed above and in the specification, peanut allergy is one of the most potent allergies. Indeed, as noted in the specification (see page 16, lines 4-11):

“Peanut allergy is one of the most common and serious of the immediate hypersensitivity reactions to foods in terms of persistence and severity of reaction. [...] The majority of cases of fatal food-induced anaphylaxis involve ingestion of peanuts [...]”

A person of ordinary skill in the art would immediately understand the exciting implications of the inventive exemplification of reduced-allergenicity peanut allergens: if it works for peanuts, it will work for other food allergens.

Modified food allergens produced according to the claimed methods are all proteins; sensitized individuals are exposed to them all by the same route (i.e., ingestion); they are all readily modified according to the same techniques, and those with reduced allergenicity are identified in the same manner. Reading the present specification, those of ordinary skill in the art will immediately appreciate that modified food allergens with reduced allergenicity, according to the present claims,

exist, and can readily be made according to the teachings of the specification. In other words, those of ordinary skill in the art will immediately appreciate that the inventors were *in possession of* the claimed invention. Denial of claims to methods of making modified food allergens would deprive the present inventors of protection commensurate in scope with their contribution, and would create silly incentives disruptive to science, the patent process, and commerce. For all of these reasons, the Examiner's rejection of claims in Group B for lack of written description, should be removed.

The rejection for lack of written description should also be removed for the claims of Group A, which stand or fall together for the purposes of this rejection. These claims are broader than those of Group B in that they do not limit the category of protein allergen whose IgE epitopes are modified. Although the claims are broad, there is no failure of written description.

The specification makes clear that the inventive principles are applicable to *any* allergen (see, for example, page 4, lines 2-14; page 7, line 26 to page 9, line 15; and page 29, lines 18-20). The specification also specifically lists a variety of relevant allergens (see, for example, page 8, lines 13-16: "Other allergens include proteins from insects such as flea, tick, mite, fire ant, cockroach, and bee as well as molds, dust, grasses, trees, weeds, and proteins from mammals including horses, dogs, cats, etc."). The specification includes extensive discussion of latex allergens, in particular, and provides references reporting IgE epitopes within these allergens (see, for example, page 8, line 19-page 9, line 15). The specification further recites methods of screening for the properties of claims 38-39 and 45 (e.g., see page 4, lines 8-14 and 26-28) and methods for performing the specific modifications of claims 40-43 (e.g., see page 4, lines 17-23 and the Examples). The specification also specifically points to the use of adjuvants having the characteristics recited in claim 44 (e.g., see page 15, lines 19-20) and to the preparation of recombinantly modified allergens as recited in claims 46-47 (e.g., see page 12 and Example 3). Likewise, the specification specifically recites relevant subsets of antigens recited in claims 48-49 (e.g., pages 7-9 and the Examples).

All of this information explicitly set forth in the specification, combined with the potent demonstration of success with the most challenging allergens, clearly put the public on notice that the inventors were in possession of the invention to the full scope of the present claims.

Appellant appreciates that certain court decisions, including *University of California v. Eli Lilly and Co.* have been interpreted to stand for the proposition that, in certain cases, nucleic acid or protein molecules cannot be properly described in a patent specification without explicit recitation of sequence information. However, this is not such a case. First, significant sequence information *is*

provided for this case. Second, as noted in the introduction to this heading, the pending claims relate to a method, not to the nucleic acids or proteins themselves. Furthermore, a determination of whether the written description requirement is satisfied requires reading the disclosure in light of the knowledge possessed by those skilled in the art *at the time that the invention was filed*. *In re Alton*, 76 F.3d 1168 (Fed. Cir. 1996). In *University of California v. Eli Lilly and Co.*, the patent applications in issue were filed in 1977 and 1979; the present application was filed 20 years later. A lot happened in the intervening 20 years. Automated sequencing and synthesis technologies were developed; PCR was invented; a variety of techniques for disrupting or otherwise mutagenizing a nucleic acid sequence were standardized. Mechanical application of a “Sequence Listing or bust” rule vitiates the very purpose of the *Lilly* ruling, which was to ensure that the scope of patent claims was commensurate in scope with the contribution. The present specification describes the invention of a method for making modified protein allergens for a wide variety of allergens; the pending claims are of appropriate scope.

***ISSUE 2: Claims 57-61 are not invalid for containing new matter***

The Examiner has questioned the support for the recitation in claims 57-61 of a step of “modifying at least 1-6, 1-5, 1-4, 1-3 or 1-2 amino acids in at least one IgE epitope of the allergen” (see § 5 of Office Action mailed October 3, 2003). With respect to this rejection claims 57-61 stand or fall together.

Appellant respectfully submits that these claims are fully supported by the specification and claims as originally filed. In particular, original claim 1 recites a step of “modifying the allergen by mutating *at least one* amino acid in an IgE binding site [...]”. Original claim 1 therefore makes it perfectly clear that the present invention encompasses methods that include a step of modifying *more than one* amino acid residue within an IgE epitope. The specification as filed further teaches IgE epitopes that include 1, 2, 3, 4, 5 or 6 amino acid residues that, when altered, lead to a reduction in IgE binding (e.g., see epitopes 5, 7, 8, 9, 18 in Table 4 and epitope 4 in Table 6, respectively). The specification and claims as originally filed therefore clearly support the language of pending claims 57-61.

***ISSUE 3: Claims 37-39 are not indefinite for reciting the term “substantially”***

The Examiner has taken the position that claims 37-39 are indefinite under 35 U.S.C. § 112, second paragraph for reciting the term “substantially” without providing a definition of the term in

the specification (see § 6 of Office Action mailed October 3, 2003). Appellant notes that the term “substantially” is not used in claim 37. Thus the rejection presumably only applies to claims 38-39. With respect to this rejection claim 37 stands or falls alone and claims 38-39 stand or fall together.

Appellant respectfully disagrees with this rejection. The courts have clearly stated that expressions such as “substantially” may be used in patent claims when warranted by the nature of invention, in order to accommodate the minor variations that may be appropriate to secure the invention. *Verve LLC v. Crane Cams*, 311 F.3d 1116 (Fed. Cir. 2002). The nature of the presently claimed invention is such that the selection of modified allergens that exhibit minor variations in T-cell activation (claim 38) or IgG binding (claim 39) as compared to an unmodified allergen could be made without losing the benefit of the present invention. One skilled in the art, upon reading the present specification, would readily recognize such trivial variations. No more is required. In fact, as noted in Judge Hand’s opinion in *Musher Foundation v. Alba Trading Co.*, 326 U.S. 770 (1945):

‘Substantially’ is not of itself fatal to a claim [...] indeed, it must always be implied in every claim, even when not introduced, and adds nothing when it is. Were this not true, few patents could be given any protection, for some departures from the precise disclosure are nearly always possible without losing the benefit of the invention.

For all of these reasons, withdrawal of the rejection is earnestly requested.

***ISSUE 4: Claims 37, 39-43, 46-47, 49-51 and 57-62 are not anticipated by Aki et al.***

The Examiner has rejected claims 37, 39-43, 46-47, 49-51 and 57-62 under 35 U.S.C. § 102(b) as being anticipated by Aki et al. (*Int. Arch. Allergy Immunol.* 103:357-364, 1994) (see § 9 of Office Action mailed October 3, 2003). This rejection is respectfully traversed; with respect to this rejection claims 37, 39-43, 46-47, 49-51 and 57-62 stand or fall together.

In order to anticipate a claim, a reference must teach every element of the claim. MPEP § 2131. Appellant submits that Aki et al. cannot anticipate the claimed invention because it does not teach all of the steps in the presently claimed method. In particular, Aki et al. does not teach at least steps (b)-(d) of claim 37.

The Examiner suggests that Aki et al. teaches a method that includes a step of modifying an allergen by “mutating at least one amino acid in the center of IgE binding sites” (see page 4 of Office Action mailed October 3, 2003). In this context, the Examiner points to pages 360-361 of Aki et al. Appellant disagrees and respectfully submits that Aki et al. never teaches the modification of a

*natural allergen* as claimed herein. Instead, Aki et al. teaches the preparation and modification of a wholly artificial  $\beta$ -galactosidase-Mag1-E2 fusion protein (e.g., see p. 359, column 2, last sentence and pp. 360-361). Mag1-E2 is an isolated IgE epitope that corresponds to amino acids 104-115 of the dust mite allergen *Mag 1*.  $\beta$ -galactosidase is a large enzyme (1024 amino acids and 116 kDa) that catalyzes the hydrolysis of terminal, non-reducing  $\beta$ -d-galactose residues in beta-galactosides. Thus, this artificial fusion protein is not a *natural allergen* that falls within the scope of claim 37. Certainly its sequence and physical properties bear no resemblance whatsoever to those of the natural 39 kDa dust mite allergen *Mag 1* taught by Aki et al. Nor is the fusion protein a “portion of a natural allergen that includes all of the IgE binding sites of the natural allergen” as defined in claim 43.

Since Aki et al. does not teach each and every step of the claimed methods, it cannot anticipate or render obvious claims 37, 39-43, 46-47, 49-51 and 57-62. Withdrawal of the rejection is earnestly requested.

***ISSUE 5: Claims 37-38, 41-43, 45-47, 49-51 and 57-62 are not anticipated by U.S. Pat. 5,547,669***

The Examiner has rejected claims 37-38, 41-43, 45-47, 49-51 and 57-62 under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. 5,547,669 (see § 10 of Office Action mailed October 3, 2003). This rejection is respectfully traversed; with respect to this rejection claims 37-38, 41-43, 45-47, 49-51 and 57-62 stand or fall together.

As noted *supra*, in order to anticipate a claim, a reference must teach every element of the claim. MPEP § 2131. Appellant submits that U.S. Pat. 5,547,669 cannot anticipate the claimed invention because it does not teach all of the steps in the presently claimed method. In particular, U.S. Pat. 5,547,669 does not teach a method that includes steps of identifying and then mutating at least one amino acid in one or more IgE binding sites of an allergen, i.e., steps (a)-(b) of claim 37.

As noted by the Examiner, U.S. Pat. 5,547,669 teaches methods of preparing so-called “recombitope peptides” that are designed to stimulate T-cell activity (e.g., see Abstract). These peptides are essentially prepared by identifying T-cell epitopes within one or more natural protein antigens and then extracting, rearranging and pasting these together to produce wholly artificial peptides (e.g., see column 6, lines 59 to column 7, line 62).

The Examiner seems to take the position that U.S. Pat. 5,547,669 also teaches a step of identifying and mutating IgE binding sites. In this context, the Examiner points to column 15, lines 1-5 and 15-17. Appellant does not see how this section of U.S. Pat. 5,547,669 teaches the

modification of IgE binding sites. Indeed, while column 15 discusses “modified recombitopes” that include an amino acid substitution, deletion or addition, there is no teaching or suggestion that these mutations should be located within IgE epitopes. In fact, U.S. Pat. 5,547,669 explicitly teaches that the mutations should be located within T-cell epitopes of the recombitopes (see column 15, lines 6-14 that was omitted from the Examiner’s citation) or should disrupt disulfide bridges in order to minimize dimerization (see column 15, lines 15-19). Further, U.S. Pat. 5,547,669 specifically teaches that in order to reduce the likelihood of IgE binding, IgE epitopes are preferably *excluded* from the amino acid sequences of recombitopes altogether:

“Those peptide regions found to bind immunoglobulin E and cause the release of mediators from mast cell or basophils in greater than approximately 10-15% of the allergic sera tested are *preferably not included* in the peptide regions arranged to form recombitope peptides”. (e.g., see column 8, lines 5-9, emphasis added)

If recombitope peptides lack IgE epitopes it is presumably undisputed that their preparation cannot involve a step of “mutating at least one amino acid in one or more IgE binding sites of an allergen”.

The Examiner also makes reference to column 15, lines 59-62 that describes the introduction of canonical protease sites (e.g., KK or RR) within a recombitope peptide. Again, Appellant notes that there is no teaching of locating such sites within IgE epitopes. We are only taught that they should be located between regions that comprise “at least one T-cell epitope” (see column 15, lines 59-62). We are further taught that these sites can “potentially aid proper antigen processing of T-cell epitopes within a recombitope peptide” and/or “result in an increase in solubility of the recombitope peptide” (see column 15, lines 55-56 and 65-67). IgE binding and IgE epitopes are never discussed in this context.

Since U.S. Pat. 5,547,669 does not teach each and every step of the claimed methods, it cannot anticipate or render obvious claims 37-38, 41-43, 45-47, 49-51 and 57-62. Withdrawal of the rejection is earnestly requested.

***ISSUE 6: Claims 37, 40-43, 48-53 and 57-62 are not anticipated by Burks et al.***

The Examiner has rejected claims 37, 40-43, 48-53 and 55-62 under 35 U.S.C. § 102(a) as being anticipated by Burks et al. (*Eur. J. Biochem.* 245:334-339, 1997) (see § 12 of Office Action

mailed October 3, 2003). Claims 55-56 and 57-62 (as dependent from claim 55) have been cancelled. With respect to this rejection claims 37, 40-43, 48-53 and 57-62 stand or fall together.

This rejection should be removed quite simply because Burks et al. is not prior art. The relevant teachings of Burks et al. were included near *verbatim* in U.S. Serial No. 08/717,933 filed September 23, 1996 (see pp. 133-155 and the Figures referred to therein). The 1996 filing was made by Appellant in part to protect the teachings of Burks et al. The present application properly claims priority to this 1996 filing. Burks et al. was published after this priority date and cannot therefore be used as prior art under 35 U.S.C. § 102(a). Withdrawal of the rejection is earnestly requested.

***ISSUE 7: Claims 37, 40-43, 48-53 and 57-62 are not anticipated by Stanley et al.***

The Examiner has rejected claims 37, 40-43, 48-53 and 55-62 under 35 U.S.C. § 102(a) as being anticipated by Stanley et al. (*Archives of Biochemistry and Biophysics* 342(2):244-253, 1997) (see § 13 of Office Action mailed October 3, 2003). Claims 55-56 and 57-62 (as dependent from claim 55) have been cancelled. With respect to this rejection claims 37, 40-43, 48-53 and 57-62 stand or fall together.

This rejection should also be removed quite simply because Stanley et al. is not prior art. The relevant teachings of Stanley et al. were included near *verbatim* in U.S. Serial No. 08/717,933 filed September 23, 1996 (see pp. 156-174 and 176-180). The 1996 filing was made by Appellant in part to protect the teachings of Stanley et al. The present application properly claims priority to this 1996 filing. Stanley et al. was published after this priority date and cannot therefore be used as prior art under 35 U.S.C. § 102(a). Withdrawal of the rejection is earnestly requested.

***ISSUE 8: Claims 37-38 and 49 are not obvious in light of Aki et al. and WO 94/11512***

The Examiner has rejected claims 37-38 and 49 under 35 U.S.C. § 103(a) as being unpatentable over Aki et al. in view of WO 94/11512 (see § 16 of Office Action mailed October 3, 2003). With respect to this rejection claims 37-38 and 49 stand or fall together.

The teachings of Aki et al. and its deficiencies with regards to claim 37 have been discussed *supra*. WO 94/11512 is a secondary reference that is cited solely as teaching limitations that are found in dependent claims 38 and 49, namely a step of screening for activation of T-cells and the use of an allergen from trees. The Examiner points to no teaching or suggestion in WO 94/11512 that could overcome the aforementioned deficiencies of Aki et al. Withdrawal of the rejection is earnestly requested.

***ISSUE 9: Claims 37 and 44 are not obvious in light of Aki et al. and U.S. Pat. 6,207,646***

The Examiner has rejected claims 37 and 44 under 35 U.S.C. § 103(a) as being unpatentable over Aki et al. in view of U.S. Pat. 6,207,646 (see § 17 of Office Action mailed October 3, 2003). With respect to this rejection claims 37 and 44 stand or fall together.

The teachings of Aki et al. and its deficiencies with regards to claim 37 have been discussed *supra*. U.S. Pat. 6,207,646 is a secondary reference that is cited solely as teaching limitations that are found in dependent claim 44, namely a step of formulating the modified allergen with a specific adjuvant. The Examiner points to no teaching or suggestion in U.S. Pat. 6,207,646 that could overcome the aforementioned deficiencies of Aki et al. Withdrawal of the rejection is earnestly requested.

***ISSUE 10: Claims 37, 48 and 52-54 are not obvious in light of Aki et al. in view of Burks et al., Stanley et al. or U.S. Pat. 5,449,669***

The Examiner has rejected claims 37, 48, 52-56 under 35 U.S.C. § 103(a) as being unpatentable over Aki et al. in view of Burks et al., Stanley et al. or U.S. Pat. 5,449,669 (see § 18 of Office Action mailed October 23, 2003). Claims 55-56 have been cancelled. With respect to this rejection claims 37, 48 and 52-54 stand or fall together.

The teachings of Aki et al. and its lackings have been discussed *supra*. As discussed *supra*, Burks et al. and Stanley et al. are not available as prior art under 35 U.S.C. § 103(a). U.S. Pat. No. 5,449,669 is cited solely as teaching an unmodified protein allergen, namely shrimp tropomyosin, and its two IgE binding epitopes. The Examiner points to no teaching or suggestion in U.S. Pat. 5,449,669 that could overcome the deficiencies of Aki et al. Withdrawal of the rejection is earnestly requested.

***ISSUE 11: Claims 37, 39-40 and 44 are not obvious in light of U.S. Pat. 5,547,669 in view of Aki et al. and U.S. Pat. 6,207,646***

The Examiner has rejected claims 37, 39-40 and 44 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. 5,547,669 in view of Aki et al. and U.S. Pat. 6,207,646 (see § 19 of Office Action mailed October 23, 2003). With respect to this rejection claims 37, 39-40 and 44 stand or fall together.

The teachings of U.S. Pat. 5,547,669 and its lackings have been discussed *supra*. Aki et al. is cited as limitations that are found in dependent claims 39 and 40, namely a step of screening for IgG



binding and mutating the allergen in the center of an IgE binding site. Additional teachings of Aki et al. are discussed *supra*. U.S. Pat. 6,207,646 is cited solely as teaching limitations that are found in dependent claim 44, namely a step of formulating the modified allergen with a specific adjuvant. The Examiner points to no teaching or suggestion in Aki et al. or U.S. Pat. 5,449,669 that could overcome the deficiencies of U.S. Pat. 5,547,669. Withdrawal of the rejection is earnestly requested.

***ISSUE 12: Claims 37, 48 and 52-54 are not obvious in light of U.S. Pat. 5,547,669 in view of Burks et al., Stanley et al. or U.S. Pat. 5,449,669***


The Examiner has rejected claims 37, 48, 52-56 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. 5,547,669 in view of Aki et al. and U.S. Pat. 6,207,646 (see § 19 of Office Action mailed October 23, 2003). Claims 55-56 have been cancelled. With respect to this rejection claims 37, 48 and 52-54 stand or fall together.

The teachings of U.S. Pat. 5,547,669 and its lackings have been discussed *supra*. As discussed *supra*, Burks et al. and Stanley et al. are not available as prior art under 35 U.S.C. § 103(a). U.S. Pat. No. 5,449,669 is cited solely as teaching an unmodified protein allergen, namely shrimp tropomyosin, and its two IgE binding epitopes. The Examiner points to no teaching or suggestion in U.S. Pat. 5,449,669 that could overcome the deficiencies of U.S. Pat. 5,547,669. Withdrawal of the rejection is earnestly requested.

**Conclusion**

Appellant again concludes with the belief that claims 37-54 and 57-62 are fully supported by the specification as filed and allowable over the art of record. Allowance of these claims is earnestly requested.

Respectfully submitted,

  
\_\_\_\_\_  
Charles E. Lyon, D.Phil.  
Limited Recognition Under 37 C.F.R. § 10.9(b)

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**Attachment I**  
to  
Appeal Brief under 37 C.F.R. § 1.192

Claims Pending



Claims Pending

1-36. **(Canceled)**

37. **(Previously presented)** A method of making a modified allergen which is less reactive with IgE comprising:

- (a) identifying one or more IgE binding sites in an allergen, the one or more IgE binding sites being ones that are recognized when the allergen is contacted with serum IgE from an individual that is allergic to the allergen;
- (b) modifying the allergen by mutating at least one amino acid in one or more IgE binding sites;
- (c) screening for IgE binding to the modified allergen using serum IgE from an individual that is allergic to the allergen; and
- (d) selecting the modified allergens which have decreased binding to IgE as compared to the unmodified allergen.

38. **(Previously presented)** The method of claim 37 further comprising screening for activation of T cells that have been cultured from an individual that is allergic to the allergen and selecting the modified allergens which activate the T cells in substantially the same way as the unmodified allergen.

39. **(Previously presented)** The method of claim 37 further comprising screening for binding of the modified allergen to IgG using serum IgG from an individual that is allergic to the allergen and selecting the modified allergens which bind IgG in substantially the same way as the unmodified allergen.

40. **(Previously presented)** The method of claim 37 wherein the modified allergen is mutated in the center of one or more of the IgE binding sites.

41. **(Previously presented)** The method of claim 37 wherein the modified allergen is mutated by substitution.

42. **(Previously presented)** The method of claim 41 wherein the modified allergen is mutated by substituting a hydrophobic amino acid in the center of one or more of the IgE binding sites with a neutral or hydrophilic amino acid.
43. **(Previously presented)** The method of claim 37 wherein the modified allergen is a portion of the allergen.
44. **(Previously presented)** The method of claim 37 wherein the modified allergen is formulated with an adjuvant selected from the group consisting of IL-12, IL-16, IL-18, IFN $\gamma$  and immune stimulatory oligodeoxynucleotide sequences containing unmethylated CpG motifs which cause brisk activation and skew the immune response to a Th1-type response.
45. **(Previously presented)** The method of claim 37 wherein the modified allergen is screened for initiation of a T cell helper 1 response.
46. **(Previously presented)** The method of claim 37 wherein the modified allergen is made in a recombinant host selected from the group consisting of plants, animals, bacteria, yeast, fungi, and insect cells.
47. **(Previously presented)** The method of claim 37 wherein the modified allergen is made in cells using site specific mutation.
48. **(Previously presented)** The method of claim 37 wherein the modified allergen is made from a peanut allergen selected from the group consisting of Ara h 1, Ara h 2, and Ara h 3.
49. **(Previously presented)** The method of claim 37 wherein the modified allergen is based on a protein obtained from a source selected from the group consisting of legumes, milks, grains, eggs, fish, crustaceans, mollusks, insects, molds, dust, grasses, trees, weeds, mammals, birds, and natural latexes.

50. **(Previously presented)** The method of claim 37, wherein the step of modifying includes mutating at least one amino acid in all the IgE epitopes of the allergen.

51. **(Previously presented)** The method of claim 37, wherein the at least one IgE epitope is one that is recognized when the allergen is contacted with a pool of sera IgE taken from a group of at least two individuals that are allergic to the allergen.

52. **(Previously presented)** A method of making a modified food allergen which is less reactive with IgE comprising:

(a) identifying one or more IgE binding sites in a food allergen, the one or more IgE binding sites being ones that are recognized when the food allergen is contacted with serum IgE from an individual that is allergic to the food allergen;

(b) modifying the food allergen by mutating at least one amino acid in one or more IgE binding sites;

(c) screening for IgE binding to the modified food allergen using serum IgE from an individual that is allergic to the food allergen; and

(d) selecting the modified food allergens which have decreased binding to IgE as compared to the unmodified food allergen.

53. **(Previously presented)** The method of claim 52 wherein the modified allergen is based on a protein obtained from a source selected from the group consisting of legumes, milks, grains, eggs, fish, crustaceans, and mollusks.

54. **(Previously presented)** The method of claim 53 wherein the modified allergen is based on a protein obtained from a source selected from the group consisting of wheat, barley, cow milk, egg, codfish, hazel nut, soybean, and shrimp.

55-56. **(Canceled)**

57. **(Previously presented)** The method of claim 37 or 52 wherein the step of modifying includes modifying at least 1-6 amino acids in at least one IgE epitope of the allergen.

58. **(Previously presented)** The method of claim 37 or 52 wherein the step of modifying includes modifying at least 1-5 amino acids in at least one IgE epitope of the allergen.

59. **(Previously presented)** The method of claim 37 or 52 wherein the step of modifying includes modifying at least 1-4 amino acids in at least one IgE epitope of the allergen.

60. **(Previously presented)** The method of claim 37 or 52 wherein the step of modifying includes modifying at least 1-3 amino acids in at least one IgE epitope of the allergen.

61. **(Previously presented)** The method of claim 37 or 52 wherein the step of modifying includes modifying at least 1-2 amino acids in at least one IgE epitope of the allergen.

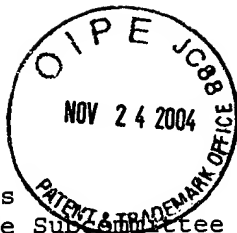
62. **(Previously presented)** The method of claim 37 or 52 wherein the step of selecting includes selecting the modified allergens which bind to IgE at levels that are less than about 1% of those observed with the unmodified allergen.

**Attachment II**

to

Appeal Brief under 37 C.F.R. § 1.192

“Official list of allergens” maintained by the IUIS Allergen Nomenclature Subcommittee  
printed on June 8, 2003 from <ftp://biobase.dk/pub/who-iuis/allergen.list>



Official list of allergens  
 IUIS Allergen Nomenclature Subcommittee  
<ftp://biobase.dk/pub/who-iuis/allergen.list>

2000.03.01 Jorgen Nedergaard Larsen and Henning Lowenstein,  
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 Please report changes, additions or comments to [jnlarsen@inet.uni2.dk](mailto:jnlarsen@inet.uni2.dk)

Legends: MW determined by reducing SDS-PAGE; asterisk: MW deduced from sequence;  
 C: cDNA seq; P: peptide seq;

| Allergen source         | Systematic and<br>original names | MW<br>kDa | sequence<br>data | Accession #<br>or<br>References |
|-------------------------|----------------------------------|-----------|------------------|---------------------------------|
| -----                   |                                  |           |                  |                                 |
| A. Weed pollens         |                                  |           |                  |                                 |
| Asterales               |                                  |           |                  |                                 |
| Ambrosia artemisiifolia |                                  |           |                  |                                 |
| (short ragweed)         | Amb a 1; antigen E               | 38        | C                | 8,20                            |
|                         | Amb a 2; antigen K               | 38        | C                | 8,21                            |
|                         | Amb a 3; Ra3                     | 11        | C                | 22                              |
|                         | Amb a 5; Ra5                     | 5         | C                | 11,23                           |
|                         | Amb a 6; Ra6                     | 10        | C                | 24,25                           |
|                         | Amb a 7; Ra7                     | 12        | P                | 26                              |
|                         | Amb a ?                          | 11        | C                | 27                              |
|                         |                                  |           |                  |                                 |
| Ambrosia trifida        |                                  |           |                  |                                 |
| (giant ragweed)         | Amb t 5; Ra5G                    | 4.4       | C                | 9,10,28                         |
|                         |                                  |           |                  |                                 |
| Artemisia vulgaris      |                                  |           |                  |                                 |
| (mugwort)               | Art v 1;                         | 27-29     | C                | 28A                             |
|                         | Art v 2;                         | 35        | P                | 29                              |
|                         |                                  |           |                  |                                 |
| Helianthus annuus       |                                  |           |                  |                                 |
| (sunflower)             | Hel a 1;                         | 34        | -                | 29a                             |
|                         | Hel a 2; profilin                | 15.7      | C                | Y15210                          |
|                         |                                  |           |                  |                                 |
| Mercurialis annua       |                                  |           |                  |                                 |
|                         | Mer a 1; profilin                | 14-15     | C                | Y13271                          |
|                         |                                  |           |                  |                                 |
| B. Grass pollens        |                                  |           |                  |                                 |
| Poales                  |                                  |           |                  |                                 |
| Cynodon dactylon        |                                  |           |                  |                                 |
| (Bermuda grass)         | Cyn d 1;                         | 32        | C                | 30,S83343                       |
|                         | Cyn d 7;                         |           | C                | 31,X91256                       |
|                         | Cyn d 12; profilin               | 14        | C                | 31a,Y08390                      |
|                         |                                  |           |                  |                                 |
| Dactylis glomerata      |                                  |           |                  |                                 |
| (orchard grass)         | Dac g 1; AgDg1                   | 32        | P                | 32                              |
|                         | Dac g 2;                         | 11        | C                | 33,S45354                       |
|                         | Dac g 3;                         |           | C                | 33a,U25343                      |
|                         | Dac g 5;                         | 31        | P                | 34                              |
|                         |                                  |           |                  |                                 |
| Holcus lanatus          |                                  |           |                  |                                 |
| (velvet grass)          | Hol l 1;                         |           | C                | Z27084,Z68893                   |



|   |  |       |   |               |
|---|--|-------|---|---------------|
| Lolium perenne<br>(rye grass)             | Lol p 1; group I                           | 27    | C | 35,36         |
|   | Lol p 2; group II                          | 11    | C | 37,37a,X73363 |
|   | Lol p 3; group III                         | 11    | C | 38            |
|   | Lol p 5; Lol p IX, Lol p Ib                | 31/35 | C | 34,39         |
|   | Lol p 11; trypsin inh. Related             | 16    |   | 39a           |
| Phalaris aquatica<br>(canary grass)       | Pha a 1;                                   |       | C | 40,S80654     |
| Phleum pratense<br>(timothy)              | Phl p 1;                                   | 27    | C | X78813        |
|   | Phl p 2;                                   |       | C | 41,X75925     |
|   | Phl p 4;                                   |       | P | 41A           |
|   | Phl p 5; Ag25                              | 32    | C | 42            |
|   | Phl p 6;                                   |       | C | 43,Z27082     |
|   | Phl p 12; profilin                         |       | C | 44,X77583     |
|   | Phl p 13; polygalacturonase                | 55-60 | C | AJ238848      |
| Poa pratensis<br>(Kentucky blue<br>grass) | Poa p 1; group I                           | 33    | P | 46            |
|   | Poa p 5;                                   | 31/34 | C | 34,47         |
| Sorghum halepense<br>(Johnson grass)      | Sor h 1;                                   |       | C | 48            |
| C. Tree pollens                           |  |       |   |               |
| Fagales:                                  |  |       |   |               |
| Alnus glutinosa<br>(alder)                | Aln g 1;                                   | 17    | C | S50892        |
| Betula verrucosa<br>(birch)               | Bet v 1;                                   | 17    | C | see iso-list  |
|   | Bet v 2; profilin                          | 15    | C | M65179        |
|   | Bet v 3;                                   |       | C | X79267        |
|   | Bet v 4;                                   | 8     | C | X87153/S54819 |
|   | Bet v 6; isoflavone reductase<br>homologue | 33.5  | C | AF135127      |
|   | Bet v 7; cyclophilin                       | 18    | P | P81531        |
| Carpinus betulus<br>(hornbeam)            | Car b 1;                                   | 17    | C | see iso-list  |
| Castanea sativa<br>(chestnut)             | Cas s 1; Bet v 1 homologue                 | 22    | P | 52            |
|   | Cas s 5; chitinase                         |       |   |               |
| Corylus avellana<br>(hazel)               | Cor a 1;                                   | 17    | C | see iso-list  |
| Quercus alba<br>(white oak)               | Que a 1;                                   | 17    | P | 54            |

Lamiales:

|   |  |       |   |            |
|---|--|-------|---|------------|
| Oleaceae:                                   |  |       |   |            |
| Fraxinus excelsior<br>(ash)                 | Fra e 1;                               | 20    | P | 58A        |
| Ligustrum vulgare<br>(privet)               | Lig v 1;                               | 20    | P | 58A        |
| Olea europea<br>(olive)                     | Ole e 1;                               | 16    | C | 59,60      |
|   | Ole e 2; profilin                      | 15-18 | C | 60A        |
|   | Ole e 3;                               | 9.2   |   | 60B        |
|   | Ole e 4;                               | 32    | P | P80741     |
|   | Ole e 5; superoxide dismutase          | 16    | P | P80740     |
|   | Ole e 6;                               | 10    | C | U86342     |
|   | Ole e 7;                               | ?     | P | P81430     |
| Syringa vulgaris<br>(lilac)                 | Syr v 1;                               | 20    | P | 58A        |
| Plantaginaceae:                             |  |       |   |            |
| Plantago lanceolata<br>(English plantain)   | Pla l 1;                               | 18    | P | P842242    |
| Pinales:                                    |  |       |   |            |
| Cryptomeria japonica<br>(sugi)              | Cry j 1;                               | 41-45 | C | 55,56      |
|   | Cry j 2;                               |       | C | 57, D29772 |
| Cupressus arizonica<br>(cypress)            | Cup a 1;                               | 43    | C | A1243570   |
| Juniperus ashei<br>(mountain cedar)         | Jun a 1;                               | 43    | P | P81294     |
|   | Jun a 3;                               | 30    | P | P81295     |
| Juniperus oxycedrus<br>(prickly juniper)    | Jun o 2; calmodulin-like               | 29    | C | AF031471   |
| Juniperus sabinoides<br>(mountain cedar)    | Jun s 1;                               | 50    | P | 58         |
| Juniperus virginiana<br>(eastern red cedar) | Jun v 1;                               | 43    | P | P81825     |
| D. Mites                                    |  |       |   |            |
| Acarus siro<br>(mite)                       | Aca s 13; fatty acid-bind.prot.14*     |       | C | AJ006774   |
| Blomia tropicalis<br>(mite)                 | Blo t 5;                               |       | C | U59102     |
|   | Blo t 12; Bt11a                        |       | C | U27479     |
|   | Blo t 13; Bt6 fatty acid-binding prot. |       | C | U58106     |

|                                |                                      |       |   |            |
|--------------------------------|--------------------------------------|-------|---|------------|
| Dermatophagoides pteronyssinus |                                      |       |   |            |
| (mite)                         | Der p 1; antigen P1                  | 25    | C | 61         |
|                                | Der p 2;                             | 14    | C | 62         |
|                                | Der p 3; trypsin                     | 28/30 | C | 63         |
|                                | Der p 4; amylase                     | 60    | P | 64         |
|                                | Der p 5;                             | 14    | C | 65         |
|                                | Der p 6; chymotrypsin                | 25    | P | 66         |
|                                | Der p 7;                             | 22-28 | C | 67         |
|                                | Der p 8; glutathione transferase     |       | C | 67A        |
|                                | Der p 9; collagenolytic serine prot. |       | P | 67B        |
|                                | Der p 10; tropomyosin                | 36    | C | Y14906     |
|                                | Der p 14; apolipophorin like p.      |       | C | Epton p.c. |
| Dermatophagoides microceras    |                                      |       |   |            |
| (mite)                         | Der m 1;                             | 25    | P | 68         |
| Dermatophagoides farinae       |                                      |       |   |            |
| (mite)                         | Der f 1 ;                            | 25    | C | 69         |
|                                | Der f 2 ;                            | 14    | C | 70,71      |
|                                | Der f 3 ;                            | 30    | C | 63         |
|                                | Der f 10; tropomyosin                |       | C | 72         |
|                                | Der f 11; paramyosin                 | 98    | C | 72a        |
|                                | Der f 14; Mag3, apolipophorin        |       | C | D17686     |
| Euroglyphus maynei             |                                      |       |   |            |
| (mite)                         | Eur m 14; apolipophorin              | 177   | C | AF149827   |
| Lepidoglyphus destructor       |                                      |       |   |            |
| (storage mite)                 | Lep d 2.0101;                        | 15    | C | 73,74,75   |
|                                | Lep d 2.0102;                        | 15    | C | 75         |
| E. Animals                     |                                      |       |   |            |
| Bos domesticus                 |                                      |       |   |            |
| (domestic cattle)              | Bos d 2; Ag3, lipocalin              | 20    | C | 76, L42867 |
| (see also foods)               | Bos d 4; alpha-lactalbumin           | 14.2  | C | M18780     |
|                                | Bos d 5; beta-lactoglobulin          | 18.3  | C | X14712     |
|                                | Bos d 6; serum albumin               | 67    | C | M73993     |
|                                | Bos d 7; immunoglobulin              | 160   |   | 77         |
|                                | Bos d 8; caseins                     | 20-30 |   | 77         |
| Canis familiaris               |                                      |       |   |            |
| (Canis domesticus)             | Can f 1;                             | 25    | C | 78,79      |
| (dog)                          | Can f 2;                             | 27    | C | 78,79      |
|                                | Can f ?; albumin                     |       | C | S72946     |
| Equus caballus                 |                                      |       |   |            |
| (domestic horse)               | Equ c 1; lipocalin                   | 25    | C | U70823     |
|                                | Equ c 2; lipocalin                   | 18.5  | P | 79A, 79B   |
| Felis domesticus               |                                      |       |   |            |
| (cat saliva)                   | Fel d 1; cat-1                       | 38    | C | 15         |
| Mus musculus                   |                                      |       |   |            |
| (mouse urine)                  | Mus m 1; MUP                         | 19    | C | 80,81      |

|                                  |  |      |   |                |
|----------------------------------|--|------|---|----------------|
| Rattus norvegicus<br>(rat urine) | Rat n 1                                  | 17   | C | 82,83          |
| F. Fungi                         |  |      |   |                |
| 1. Ascomycota                    |  |      |   |                |
| 1.1 Dothidiales                  |  |      |   |                |
| Alternaria alternata             |  |      |   |                |
|                                  | Alt a 1;                                 | 28   | C | U82633         |
|                                  | Alt a 2;                                 | 25   | C |                |
|                                  | Alt a 3; heat shock prot. 70             |      | C | U87807, U87808 |
|                                  | Alt a 4; prot.disulfidisomerase          | 57   | C | X84217         |
|                                  | Alt a 6; acid.ribosomal prot P2          | 11   | C | X78222, U87806 |
|                                  | Alt a 7; YCP4 protein                    | 22   | C | X78225         |
|                                  | Alt a 10; aldehyde dehydrogen.           | 53   | C | X78227, P42041 |
|                                  | Alt a 11; enolase                        | 45   | C | U82437         |
|                                  | Alt a 12;acid.ribosomal prot P1          | 11   | C | X84216         |
| Cladosporium herbarum            |  |      |   |                |
|                                  | Cla h 1;                                 | 13   |   | 83a, 83b       |
|                                  | Cla h 2;                                 | 23   |   | 83a, 83b       |
|                                  | Cla h 3; aldehyde dehydrogenase          | 53   | C | X78228         |
|                                  | Cla h 4; acid.ribosomal prot P2          | 11   | C | X78223         |
|                                  | Cla h 5; YCP4 protein                    | 22   | C | X78224         |
|                                  | Cla h 6; enolase                         | 46   | C | X78226         |
|                                  | Cla h 12;acid.ribosomal prot P1          | 11   | C | X85180         |
| 1.2 Eurotiales                   |  |      |   |                |
| Aspergillus flavus               |  |      |   |                |
|                                  | Asp fl 13; alkaline serine<br>proteinase | 34   |   | 84             |
| Aspergillus fumigatus            |  |      |   |                |
|                                  | Asp f 1;                                 | 18   | C | M83781,S39330  |
|                                  | Asp f 2;                                 | 37   | C | U56938         |
|                                  | Asp f 3; peroxisomal protein             | 19   | C | U20722         |
|                                  | Asp f 4;                                 | 30   | C | AJ001732       |
|                                  | Asp f 5; metalloprotease                 | 42   | C | Z30424         |
|                                  | Asp f 6; Mn superoxide dismutase         | 26.5 | C | U53561         |
|                                  | Asp f 7;                                 | 12   | C | AJ223315       |
|                                  | Asp f 8; ribosomal protein P2            | 11   | C | AJ224333       |
|                                  | Asp f 9;                                 | 34   | C | AJ223327       |
|                                  | Asp f 10; aspartic protease              | 34   | C | X85092         |
|                                  | Asp f 11; peptidyl-prolyl isom           | 24   |   | 84a            |
|                                  | Asp f 12; heat shock prot. P90           | 90   | C | 85             |
|                                  | Asp f 13; alkaline serine<br>proteinase  | 34   |   | 84b            |
|                                  | Asp f 15;                                | 16   | C | AJ002026       |
|                                  | Asp f 16;                                | 43   | C | g3643813       |
|                                  | Asp f 17;                                |      | C | AJ224865       |
|                                  | Asp f 18; vacuolar serine<br>proteinase  | 34   |   | 84c            |

|                            |                                |     |   |                |
|----------------------------|--------------------------------|-----|---|----------------|
| Aspergillus niger          | Asp n 14; beta-xylosidase      | 105 | C | AF108944       |
|                            | Asp n 18; vacuolar serine      |     |   |                |
|                            | proteinase                     | 34  | C | 84b            |
|                            | Asp n ?;                       | 85  | C | Z84377         |
| Aspergillus oryzae         | Asp o 13; alkaline serine      |     |   |                |
|                            | proteinase                     | 34  | C | X17561         |
|                            | Asp o 21; TAKA-amylase A       | 53  | C | D00434, M33218 |
| Penicillium brevicompactum | Pen b 13; alkaline serine      |     |   |                |
|                            | Proteinase                     | 33  |   | 86a            |
| Penicillium citrinum       | Pen c 3; peroxisomal membrane  |     |   |                |
|                            | protein                        | 18  |   | 86b            |
|                            | Pen c 13; alkaline serine      |     |   |                |
|                            | proteinase                     | 33  |   | 86a            |
|                            | Pen c 19; heat shock prot. P70 | 70  | C | U64207         |
| Penicillium notatum        | Pen n 13; alkaline serine      |     |   |                |
|                            | proteinase                     | 34  |   | 89             |
|                            | Pen n 18; vacuolar serine      |     |   |                |
|                            | proteinase                     | 32  |   | 89             |
|                            | Pen n 20; N-acetyl             |     |   |                |
|                            | glucosaminidase                | 68  |   | 87             |
| Penicillium oxalicum       | Pen o 18; vacuolar serine      |     |   |                |
|                            | proteinase                     | 34  |   | 89             |
| 1.3 Onygenales             |                                |     |   |                |
| Trichophyton rubrum        | Tri r 2;                       |     | C | 90             |
|                            | Tri r 4; serine protease       |     | C | 90             |
|                            |                                |     |   |                |
| Trichophyton tonsurans     | Tri t 1;                       | 30  | P | 91             |
|                            | Tri t 4; serine protease       | 83  | C | 90             |
|                            |                                |     |   |                |
| 1.4 Saccharomycetales      |                                |     |   |                |
| Candida albicans           | Cand a 1;                      | 40  | C | 88             |
|                            |                                |     |   |                |
| Candida boidinii           | Cand b 2;                      | 20  | C | J04984, J04985 |
|                            |                                |     |   |                |
| 2 Basidiomycota            |                                |     |   |                |
| 2.1 Basidiolelastomycetes  |                                |     |   |                |
| Malassezia furfur          | Mala f 1;                      |     |   | 91a            |
|                            |                                |     |   |                |

|                                 |     |   |                |
|---------------------------------|-----|---|----------------|
| Mala f 2; MF1                   | 21  | C | AB011804       |
| peroxisomal membrane protein    |     |   |                |
| Mala f 3; MF2                   | 20  | C | AB011805       |
| peroxisomal membrane protein    |     |   |                |
| Mala f 4;                       | 35  | C | Takesako, p.c. |
| Mala f 5;                       | 18* | C | AJ011955       |
| Mala f 6; cyclophilin homologue | 17* | C | AJ011956       |

## 2.2 Basidiomycetes

### Psilocybe cubensis

|                      |    |  |     |
|----------------------|----|--|-----|
| Psi c 1;             |    |  |     |
| Psi c 2; cyclophilin | 16 |  | 91b |

### Coprinus comatus (shaggy cap)

|                               |    |   |               |
|-------------------------------|----|---|---------------|
| Cop c 1; leucine zipper prot. | 11 | C | AJ132235      |
| Cop c 2;                      |    |   | Brander, p.c. |
| Cop c 3;                      |    |   | Brander, p.c. |
| Cop c 5;                      |    |   | Brander, p.c. |
| Cop c 7;                      |    |   | Brander, p.c. |

## G. Insects

### Aedes aegyptii (mosquito)

|                  |    |   |        |
|------------------|----|---|--------|
| Aed a 1; apyrase | 68 | C | L12389 |
| Aed a 2;         | 37 | C | M33157 |

### Apis mellifera (honey bee)

|                           |     |   |               |
|---------------------------|-----|---|---------------|
| Api m 1; phospholipase A2 | 16  | C | 92            |
| Api m 2; hyaluronidase    | 44  | C | 93            |
| Api m 4; melittin         | 3   | C | 94            |
| Api m 6;                  | 7-8 | P | Kettner, p.c. |

### Bombus pennsylvanicus (bumble bee)

|                        |    |   |    |
|------------------------|----|---|----|
| Bom p 1; phospholipase | 16 | P | 95 |
| Bom p 4; protease      |    | P | 95 |

### Blattella germanica (German cockroach)

|                              |    |   |    |
|------------------------------|----|---|----|
| Bla g 1; Bd90k               |    | C |    |
| Bla g 2; aspartic protease   | 36 | C | 96 |
| Bla g 4; calycin             | 21 | C | 97 |
| Bla g 5; glutathione transf. | 22 | C | 98 |
| Bla g 6; troponin C          | 27 | C | 98 |

### Periplaneta americana (American cockroach)

|                      |       |   |        |
|----------------------|-------|---|--------|
| Per a 1; Cr-P11      |       | C |        |
| Per a 3; Cr-P1       | 72-78 | C | 98A    |
| Per a 7; tropomyosin | 37    | C | Y14854 |

### Chironomus thummi thummi (midges)

|                            |    |   |        |
|----------------------------|----|---|--------|
| Chi t 1-9; hemoglobin      | 16 | C | 99     |
| Chi t 1.01; component III  | 16 | C | P02229 |
| Chi t 1.02; component IV   | 16 | C | P02230 |
| Chi t 2.0101; component I  | 16 | C | P02221 |
| Chi t 2.0102; component IA | 16 | C | P02221 |
| Chi t 3; component II-beta | 16 | C | P02222 |
| Chi t 4; component IIIA    | 16 | C | P02231 |

|                                |                            |       |   |            |
|--------------------------------|----------------------------|-------|---|------------|
|                                | Chi t 5; component VI      | 16    | C | P02224     |
|                                | Chi t 6.01; component VIIA | 16    | C | P02226     |
|                                | Chi t 6.02; component IX   | 16    | C | P02223     |
|                                | Chi t 7; component VIIB    | 16    | C | P02225     |
|                                | Chi t 8; component VIII    | 16    | C | P02227     |
|                                | Chi t 9; component X       | 16    | C | P02228     |
| <i>Dolichovespula maculata</i> |                            |       |   |            |
| (white face hornet)            | Dol m 1; phospholipase A1  | 35    | C | 100        |
|                                | Dol m 2; hyaluronidase     | 44    | C | 101        |
|                                | Dol m 5; antigen 5         | 23    | C | 102,103    |
| <i>Dolichovespula arenaria</i> |                            |       |   |            |
| (yellow hornet)                | Dol a 5; antigen 5         | 23    | C | 104        |
| <i>Polistes annularies</i>     |                            |       |   |            |
| (wasp)                         | Pol a 1; phospholipase A1  | 35    | P | 105        |
|                                | Pol a 2; hyaluronidase     | 44    | P | 105        |
|                                | Pol a 5; antigen 5         | 23    | C | 104        |
| <i>Polistes dominulus</i>      |                            |       |   |            |
| (Mediterranean paper wasp)     | Pol d 1;                   |       |   | DR Hoffman |
|                                | Pol d 4; serine protease   | 32-34 | C | DR Hoffman |
|                                | Pol d 5;                   |       |   | P81656     |
| <i>Polistes exclamans</i>      |                            |       |   |            |
| (wasp)                         | Pol e 1; phospholipase A1  | 34    | P | 107        |
|                                | Pol e 5; antigen 5         | 23    | C | 104        |
| <i>Polistes fuscatus</i>       |                            |       |   |            |
| (wasp)                         | Pol f 5; antigen 5         | 23    | C | 106        |
| <i>Polistes metricus</i>       |                            |       |   |            |
| (wasp)                         | Pol m 5; antigen 5         | 23    | P | 106        |
| <i>Vespa crabo</i>             |                            |       |   |            |
| (European hornet)              | Vesp c 1; phospholipase    | 34    | P | 107        |
|                                | Vesp c 5.0101; antigen 5   | 23    | C | 106        |
|                                | Vesp c 5.0102; antigen 5   | 23    | C | 106        |
| <i>Vespa mandarina</i>         |                            |       |   |            |
| (giant asian hornet)           | Vesp m 1.01;               |       |   | DR Hoffman |
|                                | Vesp m 1.02;               |       |   | DR Hoffman |
|                                | Vesp m 5;                  |       |   | P81657     |
| <i>Vespula flavopilosa</i>     |                            |       |   |            |
| (yellowjacket)                 | Ves f 5; antigen 5         | 23    | C | 106        |
| <i>Vespula germanica</i>       |                            |       |   |            |
| (yellowjacket)                 | Ves g 5; antigen 5         | 23    | C | 106        |
| <i>Vespula maculifrons</i>     |                            |       |   |            |
| (yellowjacket)                 | Ves m 1; phospholipase A1  | 33.5  | C | 108        |
|                                | Ves m 2; hyaluronidase     | 44    | P | 109        |
|                                | Ves m 5; antigen 5         | 23    | C | 104        |

|   |                             |       |   |                  |
|---|-----------------------------|-------|---|------------------|
| Vespula pennsylvanica<br>(yellowjacket)                             | Ves p 5; antigen 5          | 23    | C | 106              |
| Vespula squamosa<br>(yellowjacket)                                  | Ves s 5; antigen 5          | 23    | C | 106              |
| Vespula vidua<br>(wasp)   | Ves vi 5;                   | 23    | C | 106              |
| Vespula vulgaris<br>(yellowjacket)                                  | Ves v 1; phospholipase A1   | 35    | C | 105A             |
|   | Ves v 2; hyaluronidase      | 44    | P | 105A             |
|   | Ves v 5; antigen 5          | 23    | C | 104              |
| Myrmecia pilosula<br>(Australian jumper ant)                        | Myr p 1;                    |       | C | X70256           |
|   | Myr p 2;                    |       | C | S81785           |
| Solenopsis geminata<br>(tropical fire ant)                          | Sol g 2;                    |       |   | DR Hoffman       |
|   | Sol g 4;                    |       |   | DR Hoffman       |
| Solenopsis invicta<br>(fire ant)                                    | Sol i 2;                    | 13    | C | 110,111          |
|   | Sol i 3;                    | 24    | C | 110              |
|   | Sol i 4;                    | 13    | C | 110              |
| Solenopsis saevissima<br>(brazilian fire ant)                       | Sol s 2;                    |       |   | DR Hoffman       |
| H. Foods  |                             |       |   |                  |
| Gadus callarias<br>(cod)  | Gad c 1; allergen M         | 12    | C | 112,113          |
| Salmo salar<br>(Atlantic salmon)                                    | Sal s 1; parvalbumin        | 12    | C | X97824<br>X97825 |
| Bos domesticus<br>(domestic cattle)<br>(milk)<br>(see also animals) | Bos d 4; alpha-lactalbumin  | 14.2  | C | M18780           |
|   | Bos d 5; beta-lactoglobulin | 18.3  | C | X14712           |
|   | Bos d 6; serum albumin      | 67    | C | M73993           |
|   | Bos d 7; immunoglobulin     | 160   |   | 77               |
|   | Bos d 8; caseins            | 20-30 |   | 77               |
| Gallus domesticus<br>(chicken)                                      | Gal d 1; ovomucoid          | 28    | C | 114,115          |
|   | Gal d 2; ovalbumin          | 44    | C | 114,115          |
|   | Gal d 3; conalbumin (Ag22)  | 78    | C | 114,115          |
|   | Gal d 4; lysozyme           | 14    | C | 114,115          |
|   | Gal d 5; serum albumin      | 69    | C | X60688           |
| Metapenaeus ensis<br>(shrimp)                                       | Met e 1; tropomyosin        |       | C | U08008           |
| Penaeus aztecus<br>(shrimp)   | Pen a 1; tropomyosin        | 36    | P | 116              |



|  |   |                  |             |                                  |
|--|---|------------------|-------------|----------------------------------|
| <i>Penaeus indicus</i><br>(shrimp)           | Pen i 1; tropomyosin  | 34               | C           | 117                              |
| <i>Todarodes pacificus</i><br>(squid)        | Tod p 1; tropomyosin  | 38               | P           | 117A                             |
| <i>Haliotis Midae</i><br>(abalone)           | Hal m 1   | 49               | -           | 117B                             |
| <i>Apium graveolens</i><br>(celery)          | Api g 1; Bet v 1 homologue<br>Api g 4; profilin<br>Api g 5;                                   | 16*<br>55/58     | C<br>P      | Z48967<br>AF129423<br>P81943     |
| <i>Brassica juncea</i><br>(oriental mustard) | Bra j 1; 2S albumin   | 14               | C           | 118                              |
| <i>Brassica rapa</i><br>(turnip)             | Bra r 2; prohevein-like protein   | 25               | ?           | P81729                           |
| <i>Hordeum vulgare</i><br>(barley)           | Hor v 15; BMAI-1  | 15               | C           | 119                              |
| <i>Zea mays</i><br>(maize, corn)             | Zea m 14; lipid transfer prot.  | 9                | P           | P19656                           |
| <i>Oryza sativa</i><br>(rice)                | Ory s 1;  |                  | C           | U31771                           |
| <i>Corylus avellana</i><br>(hazelnut)        | Cor a 1.0401; Bet v 1 homologue   | 17               | C           | AF136945                         |
| <i>Malus domestica</i><br>(apple)            | Mal d 1; Bet v 1 homologue<br>Mal d 2; thaumatin homologue<br>Mal d 3; lipid transfer protein | 9                | C<br>C<br>C | X83672<br>AJ243427<br>Pastorello |
| <i>Pyrus communis</i><br>(pear)              | Pyr c 1; Bet v 1 homologue<br>Pyr c 4; profilin<br>Pyr c 5; isoflavone reductase<br>homologue | 18<br>14<br>33.5 | C<br>C<br>C | AF05730<br>AF129424<br>AF071477  |
| <i>Persea americana</i><br>(avocado)         | Pers a 1; endochitinase   | 32               | C           | Z78202                           |
| <i>Prunus armeniaca</i><br>(apricot)         | Pru ar 1; Bet v 1 homologue<br>Pru ar 3; lipid transfer protein                               | 9                | C<br>P      | U93165                           |
| <i>Prunus avium</i><br>(sweet cherry)        | Pru av 1; Bet v 1 homologue<br>Pru av 2; thaumatin homologue<br>Pru av 4; profilin            | 15               | C<br>C<br>C | U66076<br>U32440<br>AF129425     |
| <i>Prunus persica</i><br>(peach)             | Pru p 3; lipid transfer protein   | 10               | P           | P81402                           |

|                                      |   |             |   |               |
|--------------------------------------|---|-------------|---|---------------|
| Sinapis alba<br>(yellow mustard)     | Sin a 1; 2S albumin                                 | 14          | C | 120           |
| Glycine max<br>(soybean)             | Gly m 1.0101; HPS                                   | 7.5         | P | 121           |
|                                      | Gly m 1.0102; HPS                                   | 7           | P | 121           |
|                                      | Gly m 2   | 8           | P | A57106        |
|                                      | Gly m 3; profilin                                   | 14          | C | AJ223982      |
| Arachis hypogaea<br>(Peanut)         | Ara h 1; vicilin                                    | 63.5        | C | L34402        |
|                                      | Ara h 2; conglutin                                  | 17          | C | L77197        |
|                                      | Ara h 3; glycinin                                   | 60          | C | AF093541      |
|                                      | Ara h 4; glycinin                                   | 37          | C | AF086821      |
|                                      | Ara h 5; profilin                                   | 15          | C | AF059616      |
|                                      | Ara h 6; conglutin homolog                          | 15          | C | AF092846      |
|                                      | Ara h 7; conglutin homolog                          | 15          | C | AF091737      |
| Actinidia chinensis<br>(kiwi)        | Act c 1; cysteine protease                          | 30          | P | P00785        |
| Solanum tuberosum<br>(potato)        | Sola t 1; patatin                                   | 43          | P | P15476        |
| Bertholletia excelsa<br>(Brazil nut) | Ber e 1; 2S albumin                                 | 9           | C | P04403,M17146 |
| Juglans regia<br>(English walnut)    | Jug r 1; 2S albumin                                 |             | C | U66866        |
|                                      | Jug r 2; vicilin                                    | 44          | C | AF066055      |
| Ricinus communis<br>(Castor bean)    | Ric c 1; 2S albumin                                 |             | C | P01089        |
| I. Others                            |   |             |   |               |
| Anisakis simplex<br>(nematode)       | Ani s 1;  | 24          | P | A59069        |
|                                      | Ani s 2; paramyosin                                 | 97          | C | AF173004      |
| Ascaris suum<br>(worm)               | Asc s 1;  | 10          | P | 122           |
| Den n<br>(red coral)                 | Den n 1;  |             |   | Onizuka, p.c. |
| Hevea brasiliensis<br>(rubber)       | Hev b 1; elongation factor                          | 58          | P | 123,124       |
|                                      | Hev b 2; ( 1,3-glucanase                            | 34/36       | C | 125           |
|                                      | Hev b 3   | 24          | P | 126,127       |
|                                      | Hev b 4; component of<br>microhelix protein complex | 100/110/115 | P | 128           |
|                                      | Hev b 5   | 16          | C | U42640        |
|                                      | Hev b 6.01 hevein precursor                         | 20          | C | M36986/p02877 |
|                                      | Hev b 6.02 hevein                                   | 5           | C | M36986/p02877 |

|                                 |    |   |                       |
|---------------------------------|----|---|-----------------------|
| Hev b 6.03 C-terminal fragment  | 14 | C | M36986/p02877         |
| Hev b 7; patatin homologue      | 46 | C | U80598                |
| Hev b 8; profilin               | 14 | C | Y15042                |
| Hev b 9; enolase                | 51 | C | AJ132580/<br>AJ132581 |
| Hev b 10; Mn-superoxide dismut. | 26 | C | AJ249148              |

*Ctenocephalides felis felis*  
(cat flea)

|              |    |   |          |
|--------------|----|---|----------|
| Cte f 1;     |    |   |          |
| Cte f 2; M1b | 27 | C | AF231352 |

*Homo sapiens*

|                                |       |   |        |
|--------------------------------|-------|---|--------|
| (human autoallergens) Hom s 1; | 73*   | C | Y14314 |
| Hom s 2;                       | 10.3* | C | X80909 |
| Hom s 3;                       | 20.1* | C | X89985 |
| Hom s 4;                       | 36*   | C | Y17711 |
| Hom s 5;                       | 42.6* | C | P02538 |

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Official list of allergens  
 IUIS Allergen Nomenclature Subcommittee  
 ftp://biobase.dk/pub/who-iuis/allergen.list

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Legends: MW determined by reducing SDS-PAGE; asterisk: MW deduced from sequence;  
 C: cDNA seq; P: peptide seq;

| Allergen source         | Systematic and<br>original names | MW<br>kDa | sequence<br>or<br>data | Accession #<br>or<br>References |
|-------------------------|----------------------------------|-----------|------------------------|---------------------------------|
| -----                   |                                  |           |                        |                                 |
| A. Weed pollens         |                                  |           |                        |                                 |
| Asterales               |                                  |           |                        |                                 |
| Ambrosia artemisiifolia |                                  |           |                        |                                 |
| (short ragweed)         | Amb a 1; antigen E               | 38        | C                      | 8,20                            |
|                         | Amb a 2; antigen K               | 38        | C                      | 8,21.                           |
|                         | Amb a 3; Ra3                     | 11        | C                      | 22                              |
|                         | Amb a 5; Ra5                     | 5         | C                      | 11,23                           |
|                         | Amb a 6; Ra6                     | 10        | C                      | 24,25                           |
|                         | Amb a 7; Ra7                     | 12        | P                      | 26                              |
|                         | Amb a ?                          | 11        | C                      | 27                              |
|                         |                                  |           |                        |                                 |
| Ambrosia trifida        |                                  |           |                        |                                 |
| (giant ragweed)         | Amb t 5; Ra5G                    | 4.4       | C                      | 9,10,28                         |
|                         |                                  |           |                        |                                 |
| Artemisia vulgaris      |                                  |           |                        |                                 |
| (mugwort)               | Art v 1;                         | 27-29     | C                      | 28A                             |
|                         | Art v 2;                         | 35        | P                      | 29                              |
|                         |                                  |           |                        |                                 |
| Helianthus annuus       |                                  |           |                        |                                 |
| (sunflower)             | Hel a 1;                         | 34        | -                      | 29a                             |
|                         | Hel a 2; profilin                | 15.7      | C                      | Y15210                          |
|                         |                                  |           |                        |                                 |
| Mercurialis annua       |                                  |           |                        |                                 |
|                         | Mer a 1; profilin                | 14-15     | C                      | Y13271                          |
| B. Grass pollens        |                                  |           |                        |                                 |
| Poales                  |                                  |           |                        |                                 |
| Cynodon dactylon        |                                  |           |                        |                                 |
| (Bermuda grass)         | Cyn d 1;                         | 32        | C                      | 30,S83343                       |
|                         | Cyn d 7;                         |           | C                      | 31,X91256                       |
|                         | Cyn d 12; profilin               | 14        | C                      | 31a,Y08390                      |
|                         |                                  |           |                        |                                 |
| Dactylis glomerata      |                                  |           |                        |                                 |
| (orchard grass)         | Dac g 1; AgDg1                   | 32        | P                      | 32                              |
|                         | Dac g 2;                         | 11        | C                      | 33,S45354                       |
|                         | Dac g 3;                         |           | C                      | 33a,U25343                      |
|                         | Dac g 5;                         | 31        | P                      | 34                              |
|                         |                                  |           |                        |                                 |
| Holcus lanatus          |                                  |           |                        |                                 |
| (velvet grass)          | Hol l 1;                         |           | C                      | Z27084,Z68893                   |

|   |  |       |   |               |
|---|--|-------|---|---------------|
| Lolium perenne<br>(rye grass)             | Lol p 1; group I                           | 27    | C | 35,36         |
|   | Lol p 2; group II                          | 11    | C | 37,37a,X73363 |
|   | Lol p 3; group III                         | 11    | C | 38            |
|   | Lol p 5; Lol p IX, Lol p Ib                | 31/35 | C | 34,39         |
|   | Lol p 11; trypsin inh. Related             | 16    |   | 39a           |
| Phalaris aquatica<br>(canary grass)       | Pha a 1;                                   |       | C | 40,S80654     |
| Phleum pratense<br>(timothy)              | Phl p 1;                                   | 27    | C | X78813        |
|   | Phl p 2;                                   |       | C | 41,X75925     |
|   | Phl p 4;                                   |       | P | 41A           |
|   | Phl p 5; Ag25                              | 32    | C | 42            |
|   | Phl p 6;                                   |       | C | 43,Z27082     |
|   | Phl p 12; profilin                         |       | C | 44,X77583     |
|   | Phl p 13; polygalacturonase                | 55-60 | C | AJ238848      |
| Poa pratensis<br>(Kentucky blue<br>grass) | Poa p 1; group I                           | 33    | P | 46            |
|   | Poa p 5;                                   | 31/34 | C | 34,47         |
| Sorghum halepense<br>(Johnson grass)      | Sor h 1;                                   |       | C | 48            |
| C. Tree pollens                           |  |       |   |               |
| Fagales:                                  |  |       |   |               |
| Alnus glutinosa<br>(alder)                | Aln g 1;                                   | 17    | C | S50892        |
| Betula verrucosa<br>(birch)               | Bet v 1;                                   | 17    | C | see iso-list  |
|   | Bet v 2; profilin                          | 15    | C | M65179        |
|   | Bet v 3;                                   |       | C | X79267        |
|   | Bet v 4;                                   | 8     | C | X87153/S54819 |
|   | Bet v 6; isoflavone reductase<br>homologue | 33.5  | C | AF135127      |
|   | Bet v 7; cyclophilin                       | 18    | P | P81531        |
| Carpinus betulus<br>(hornbeam)            | Car b 1;                                   | 17    | C | see iso-list  |
| Castanea sativa<br>(chestnut)             | Cas s 1; Bet v 1 homologue                 | 22    | P | 52            |
|   | Cas s 5; chitinase                         |       |   |               |
| Corylus avellana<br>(hazel)               | Cor a 1;                                   | 17    | C | see iso-list  |
| Quercus alba<br>(white oak)               | Que a 1;                                   | 17    | P | 54            |

Lamiales:

Oleaceae:

|                               |                               |       |   |        |
|-------------------------------|-------------------------------|-------|---|--------|
| Fraxinus excelsior<br>(ash)   | Fra e 1;                      | 20    | P | 58A    |
| Ligustrum vulgare<br>(privet) | Lig v 1;                      | 20    | P | 58A    |
| Olea europea<br>(olive)       | Ole e 1;                      | 16    | C | 59,60  |
|                               | Ole e 2; profilin             | 15-18 | C | 60A    |
|                               | Ole e 3;                      | 9.2   |   | 60B    |
|                               | Ole e 4;                      | 32    | P | P80741 |
|                               | Ole e 5; superoxide dismutase | 16    | P | P80740 |
|                               | Ole e 6;                      | 10    | C | U86342 |
|                               | Ole e 7;                      | ?     | P | P81430 |
| Syringa vulgaris<br>(lilac)   | Syr v 1;                      | 20    | P | 58A    |

Plantaginaceae:

|   |          |    |   |         |
|---|----------|----|---|---------|
| Plantago lanceolata<br>(English plantain) | Pla l 1; | 18 | P | P842242 |
|---|----------|----|---|---------|

Pinales:

|   |                          |       |   |            |
|---|--------------------------|-------|---|------------|
| Cryptomeria japonica<br>(sugi)              | Cry j 1;                 | 41-45 | C | 55,56      |
|   | Cry j 2;                 |       | C | 57, D29772 |
| Cupressus arizonica<br>(cypress)            | Cup a 1;                 | 43    | C | A1243570   |
| Juniperus ashei<br>(mountain cedar)         | Jun a 1;                 | 43    | P | P81294     |
|   | Jun a 3;                 | 30    | P | P81295     |
| Juniperus oxycedrus<br>(prickly juniper)    | Jun o 2; calmodulin-like | 29    | C | AF031471   |
| Juniperus sabinoides<br>(mountain cedar)    | Jun s 1;                 | 50    | P | 58         |
| Juniperus virginiana<br>(eastern red cedar) | Jun v 1;                 | 43    | P | P81825     |

D. Mites

|                             |  |  |   |          |
|-----------------------------|--|--|---|----------|
| Acarus siro<br>(mite)       | Aca s 13; fatty acid-bind.prot.14*     |  | C | AJ006774 |
| Blomia tropicalis<br>(mite) | Blo t 5;                               |  | C | U59102   |
|                             | Blo t 12; Bt11a                        |  | C | U27479   |
|                             | Blo t 13; Bt6 fatty acid-binding prot. |  | C | U58106   |



|                                       |                                      |       |   |            |
|---------------------------------------|--------------------------------------|-------|---|------------|
| <i>Dermatophagoides pteronyssinus</i> |                                      |       |   |            |
| (mite)                                | Der p 1; antigen P1                  | 25    | C | 61         |
|                                       | Der p 2;                             | 14    | C | 62         |
|                                       | Der p 3; trypsin                     | 28/30 | C | 63         |
|                                       | Der p 4; amylase                     | 60    | P | 64         |
|                                       | Der p 5;                             | 14    | C | 65         |
|                                       | Der p 6; chymotrypsin                | 25    | P | 66         |
|                                       | Der p 7;                             | 22-28 | C | 67         |
|                                       | Der p 8; glutathione transferase     |       | C | 67A        |
|                                       | Der p 9; collagenolytic serine prot. |       | P | 67B        |
|                                       | Der p 10; tropomyosin                | 36    | C | Y14906     |
|                                       | Der p 14; apolipophorin like p.      |       | C | Epton p.c. |
| <i>Dermatophagoides microceras</i>    |                                      |       |   |            |
| (mite)                                | Der m 1;                             | 25    | P | 68         |
| <i>Dermatophagoides farinae</i>       |                                      |       |   |            |
| (mite)                                | Der f 1 ;                            | 25    | C | 69         |
|                                       | Der f 2 ;                            | 14    | C | 70,71      |
|                                       | Der f 3 ;                            | 30    | C | 63         |
|                                       | Der f 10; tropomyosin                |       | C | 72         |
|                                       | Der f 11; paramyosin                 | 98    | C | 72a        |
|                                       | Der f 14; Mag3, apolipophorin        |       | C | D17686     |
| <i>Euroglyphus maynei</i>             |                                      |       |   |            |
| (mite)                                | Eur m 14; apolipophorin              | 177   | C | AF149827   |
| <i>Lepidoglyphus destructor</i>       |                                      |       |   |            |
| (storage mite)                        | Lep d 2.0101;                        | 15    | C | 73,74,75   |
|                                       | Lep d 2.0102;                        | 15    | C | 75         |
| E. Animals                            |                                      |       |   |            |
| <i>Bos domesticus</i>                 |                                      |       |   |            |
| (domestic cattle)                     | Bos d 2; Ag3, lipocalin              | 20    | C | 76, L42867 |
| (see also foods)                      | Bos d 4; alpha-lactalbumin           | 14.2  | C | M18780     |
|                                       | Bos d 5; beta-lactoglobulin          | 18.3  | C | X14712     |
|                                       | Bos d 6; serum albumin               | 67    | C | M73993     |
|                                       | Bos d 7; immunoglobulin              | 160   |   | 77         |
|                                       | Bos d 8; caseins                     | 20-30 |   | 77         |
| <i>Canis familiaris</i>               |                                      |       |   |            |
| ( <i>Canis domesticus</i> )           | Can f 1;                             | 25    | C | 78,79      |
| (dog)                                 | Can f 2;                             | 27    | C | 78,79      |
|                                       | Can f ?; albumin                     |       | C | S72946     |
| <i>Equus caballus</i>                 |                                      |       |   |            |
| (domestic horse)                      | Equ c 1; lipocalin                   | 25    | C | U70823     |
|                                       | Equ c 2; lipocalin                   | 18.5  | P | 79A, 79B   |
| <i>Felis domesticus</i>               |                                      |       |   |            |
| (cat saliva)                          | Fel d 1; cat-1                       | 38    | C | 15         |
| <i>Mus musculus</i>                   |                                      |       |   |            |
| (mouse urine)                         | Mus m 1; MUP                         | 19    | C | 80,81      |

|                                  |  |      |   |                |
|----------------------------------|--|------|---|----------------|
| Rattus norvegicus<br>(rat urine) | Rat n 1                                  | 17   | C | 82, 83         |
| F. Fungi                         |  |      |   |                |
| 1. Ascomycota                    |  |      |   |                |
| 1.1 Dothidiales                  |  |      |   |                |
| Alternaria alternata             |  |      |   |                |
|                                  | Alt a 1;                                 | 28   | C | U82633         |
|                                  | Alt a 2;                                 | 25   | C |                |
|                                  | Alt a 3; heat shock prot. 70             |      | C | U87807, U87808 |
|                                  | Alt a 4; prot.disulfidisomerase          | 57   | C | X84217         |
|                                  | Alt a 6; acid.ribosomal prot P2          | 11   | C | X78222, U87806 |
|                                  | Alt a 7; YCP4 protein                    | 22   | C | X78225         |
|                                  | Alt a 10; aldehyde dehydrogen.           | 53   | C | X78227, P42041 |
|                                  | Alt a 11; enolase                        | 45   | C | U82437         |
|                                  | Alt a 12; acid.ribosomal prot P1         | 11   | C | X84216         |
| Cladosporium herbarum            |  |      |   |                |
|                                  | Cla h 1;                                 | 13   |   | 83a, 83b       |
|                                  | Cla h 2;                                 | 23   |   | 83a, 83b       |
|                                  | Cla h 3; aldehyde dehydrogenase          | 53   | C | X78228         |
|                                  | Cla h 4; acid.ribosomal prot P2          | 11   | C | X78223         |
|                                  | Cla h 5; YCP4 protein                    | 22   | C | X78224         |
|                                  | Cla h 6; enolase                         | 46   | C | X78226         |
|                                  | Cla h 12; acid.ribosomal prot P1         | 11   | C | X85180         |
| 1.2 Eurotiales                   |  |      |   |                |
| Aspergillus flavus               |  |      |   |                |
|                                  | Asp fl 13; alkaline serine<br>proteinase | 34   |   | 84             |
| Aspergillus fumigatus            |  |      |   |                |
|                                  | Asp f 1;                                 | 18   | C | M83781, S39330 |
|                                  | Asp f 2;                                 | 37   | C | U56938         |
|                                  | Asp f 3; peroxisomal protein             | 19   | C | U20722         |
|                                  | Asp f 4;                                 | 30   | C | AJ001732       |
|                                  | Asp f 5; metalloprotease                 | 42   | C | Z30424         |
|                                  | Asp f 6; Mn superoxide dismutase         | 26.5 | C | U53561         |
|                                  | Asp f 7;                                 | 12   | C | AJ223315       |
|                                  | Asp f 8; ribosomal protein P2            | 11   | C | AJ224333       |
|                                  | Asp f 9;                                 | 34   | C | AJ223327       |
|                                  | Asp f 10; aspartic protease              | 34   | C | X85092         |
|                                  | Asp f 11; peptidyl-prolyl isom           | 24   |   | 84a            |
|                                  | Asp f 12; heat shock prot. P90           | 90   | C | 85             |
|                                  | Asp f 13; alkaline serine<br>proteinase  | 34   |   | 84b            |
|                                  | Asp f 15;                                | 16   | C | AJ002026       |
|                                  | Asp f 16;                                | 43   | C | g3643813       |
|                                  | Asp f 17;                                |      | C | AJ224865       |
|                                  | Asp f 18; vacuolar serine<br>proteinase  | 34   |   | 84c            |

|                            |                                |     |   |                |
|----------------------------|--------------------------------|-----|---|----------------|
| Aspergillus niger          | Asp n 14; beta-xylosidase      | 105 | C | AF108944       |
|                            | Asp n 18; vacuolar serine      |     |   |                |
|                            | proteinase                     | 34  | C | 84b            |
|                            | Asp n ?;                       | 85  | C | Z84377         |
| Aspergillus oryzae         | Asp o 13; alkaline serine      |     |   |                |
|                            | proteinase                     | 34  | C | X17561         |
|                            | Asp o 21; TAKA-amylase A       | 53  | C | D00434, M33218 |
| Penicillium brevicompactum | Pen b 13; alkaline serine      |     |   |                |
|                            | Proteinase                     | 33  |   | 86a            |
| Penicillium citrinum       | Pen c 3; peroxisomal membrane  |     |   |                |
|                            | protein                        | 18  |   | 86b            |
|                            | Pen c 13; alkaline serine      |     |   |                |
|                            | proteinase                     | 33  |   | 86a            |
|                            | Pen c 19; heat shock prot. P70 | 70  | C | U64207         |
| Penicillium notatum        | Pen n 13; alkaline serine      |     |   |                |
|                            | proteinase                     | 34  |   | 89             |
|                            | Pen n 18; vacuolar serine      |     |   |                |
|                            | proteinase                     | 32  |   | 89             |
|                            | Pen n 20; N-acetyl             |     |   |                |
|                            | glucosaminidase                | 68  |   | 87             |
| Penicillium oxalicum       | Pen o 18; vacuolar serine      |     |   |                |
|                            | proteinase                     | 34  |   | 89             |
| 1.3 Onygenales             |                                |     |   |                |
| Trichophyton rubrum        | Tri r 2;                       |     | C | 90             |
|                            | Tri r 4; serine protease       |     | C | 90             |
| Trichophyton tonsurans     | Tri t 1;                       | 30  | P | 91             |
|                            | Tri t 4; serine protease       | 83  | C | 90             |
|                            |                                |     |   |                |
| 1.4 Saccharomycetales      |                                |     |   |                |
| Candida albicans           | Cand a 1;                      | 40  | C | 88             |
|                            |                                |     |   |                |
| Candida boidinii           | Cand b 2;                      | 20  | C | J04984, J04985 |
|                            |                                |     |   |                |
| 2 Basidiomycota            |                                |     |   |                |
| 2.1 Basidiolaelastomycetes |                                |     |   |                |
| Malassezia furfur          | Mala f 1;                      |     |   | 91a            |
|                            |                                |     |   |                |

|                                 |     |   |               |
|---------------------------------|-----|---|---------------|
| Mala f 2; MF1                   | 21  | C | AB011804      |
| peroxisomal membrane protein    |     |   |               |
| Mala f 3; MF2                   | 20  | C | AB011805      |
| peroxisomal membrane protein    |     |   |               |
| Mala f 4;                       | 35  | C | Takesako,p.c. |
| Mala f 5;                       | 18* | C | AJ011955      |
| Mala f 6; cyclophilin homologue | 17* | C | AJ011956      |

## 2.2 Basidiomycetes

### Psilocybe cubensis

|                      |    |  |     |
|----------------------|----|--|-----|
| Psi c 1;             |    |  |     |
| Psi c 2; cyclophilin | 16 |  | 91b |

### Coprinus comatus (shaggy cap)

|                               |    |   |              |
|-------------------------------|----|---|--------------|
| Cop c 1; leucine zipper prot. | 11 | C | AJ132235     |
| Cop c 2;                      |    |   | Brander,p.c. |
| Cop c 3;                      |    |   | Brander,p.c. |
| Cop c 5;                      |    |   | Brander,p.c. |
| Cop c 7;                      |    |   | Brander,p.c. |

## G. Insects

### Aedes aegyptii (mosquito)

|                  |    |   |        |
|------------------|----|---|--------|
| Aed a 1; apyrase | 68 | C | L12389 |
| Aed a 2;         | 37 | C | M33157 |

### Apis mellifera (honey bee)

|                           |     |   |              |
|---------------------------|-----|---|--------------|
| Api m 1; phospholipase A2 | 16  | C | 92           |
| Api m 2; hyaluronidase    | 44  | C | 93           |
| Api m 4; melittin         | 3   | C | 94           |
| Api m 6;                  | 7-8 | P | Kettner,p.c. |

### Bombus pennsylvanicus (bumble bee)

|                        |    |   |    |
|------------------------|----|---|----|
| Bom p 1; phospholipase | 16 | P | 95 |
| Bom p 4; protease      |    | P | 95 |

### Blattella germanica (German cockroach)

|                              |    |   |    |
|------------------------------|----|---|----|
| Bla g 1; Bd90k               |    | C |    |
| Bla g 2; aspartic protease   | 36 | C | 96 |
| Bla g 4; calycin             | 21 | C | 97 |
| Bla g 5; glutathione transf. | 22 | C | 98 |
| Bla g 6; troponin C          | 27 | C | 98 |

### Periplaneta americana (American cockroach)

|                      |       |   |        |
|----------------------|-------|---|--------|
| Per a 1; Cr-P11      |       | C |        |
| Per a 3; Cr-P1       | 72-78 | C | 98A    |
| Per a 7; tropomyosin | 37    | C | Y14854 |

### Chironomus thummi thummi (midges)

|                            |    |   |        |
|----------------------------|----|---|--------|
| Chi t 1-9; hemoglobin      | 16 | C | 99     |
| Chi t 1.01; component III  | 16 | C | P02229 |
| Chi t 1.02; component IV   | 16 | C | P02230 |
| Chi t 2.0101; component I  | 16 | C | P02221 |
| Chi t 2.0102; component IA | 16 | C | P02221 |
| Chi t 3; component II-beta | 16 | C | P02222 |
| Chi t 4; component IIIA    | 16 | C | P02231 |

|                                |                            |       |   |            |
|--------------------------------|----------------------------|-------|---|------------|
|                                | Chi t 5; component VI      | 16    | C | P02224     |
|                                | Chi t 6.01; component VIIA | 16    | C | P02226     |
|                                | Chi t 6.02; component IX   | 16    | C | P02223     |
|                                | Chi t 7; component VIIB    | 16    | C | P02225     |
|                                | Chi t 8; component VIII    | 16    | C | P02227     |
|                                | Chi t 9; component X       | 16    | C | P02228     |
| <i>Dolichovespula maculata</i> |                            |       |   |            |
| (white face hornet)            | Dol m 1; phospholipase A1  | 35    | C | 100        |
|                                | Dol m 2; hyaluronidase     | 44    | C | 101        |
|                                | Dol m 5; antigen 5         | 23    | C | 102,103    |
| <i>Dolichovespula arenaria</i> |                            |       |   |            |
| (yellow hornet)                | Dol a 5; antigen 5         | 23    | C | 104        |
| <i>Polistes annularies</i>     |                            |       |   |            |
| (wasp)                         | Pol a 1; phospholipase A1  | 35    | P | 105        |
|                                | Pol a 2; hyaluronidase     | 44    | P | 105        |
|                                | Pol a 5; antigen 5         | 23    | C | 104        |
| <i>Polistes dominulus</i>      |                            |       |   |            |
| (Mediterranean paper wasp)     | Pol d 1;                   |       |   | DR Hoffman |
|                                | Pol d 4; serine protease   | 32-34 | C | DR Hoffman |
|                                | Pol d 5;                   |       |   | P81656     |
| <i>Polistes exclamans</i>      |                            |       |   |            |
| (wasp)                         | Pol e 1; phospholipase A1  | 34    | P | 107        |
|                                | Pol e 5; antigen 5         | 23    | C | 104        |
| <i>Polistes fuscatus</i>       |                            |       |   |            |
| (wasp)                         | Pol f 5; antigen 5         | 23    | C | 106        |
| <i>Polistes metricus</i>       |                            |       |   |            |
| (wasp)                         | Pol m 5; antigen 5         | 23    | P | 106        |
| <i>Vespa crabo</i>             |                            |       |   |            |
| (European hornet)              | Vesp c 1; phospholipase    | 34    | P | 107        |
|                                | Vesp c 5.0101; antigen 5   | 23    | C | 106        |
|                                | Vesp c 5.0102; antigen 5   | 23    | C | 106        |
| <i>Vespa mandarina</i>         |                            |       |   |            |
| (giant asian hornet)           | Vesp m 1.01;               |       |   | DR Hoffman |
|                                | Vesp m 1.02;               |       |   | DR Hoffman |
|                                | Vesp m 5;                  |       |   | P81657     |
| <i>Vespula flavopilosa</i>     |                            |       |   |            |
| (yellowjacket)                 | Ves f 5; antigen 5         | 23    | C | 106        |
| <i>Vespula germanica</i>       |                            |       |   |            |
| (yellowjacket)                 | Ves g 5; antigen 5         | 23    | C | 106        |
| <i>Vespula maculifrons</i>     |                            |       |   |            |
| (yellowjacket)                 | Ves m 1; phospholipase A1  | 33.5  | C | 108        |
|                                | Ves m 2; hyaluronidase     | 44    | P | 109        |
|                                | Ves m 5; antigen 5         | 23    | C | 104        |

|   |                             |       |   |                  |
|---|-----------------------------|-------|---|------------------|
| Vespula pennsylvanica<br>(yellowjacket)                             | Ves p 5; antigen 5          | 23    | C | 106              |
| Vespula squamosa<br>(yellowjacket)                                  | Ves s 5; antigen 5          | 23    | C | 106              |
| Vespula vidua<br>(wasp)   | Ves vi 5;                   | 23    | C | 106              |
| Vespula vulgaris<br>(yellowjacket)                                  | Ves v 1; phospholipase A1   | 35    | C | 105A             |
|   | Ves v 2; hyaluronidase      | 44    | P | 105A             |
|   | Ves v 5; antigen 5          | 23    | C | 104              |
| Myrmecia pilosula<br>(Australian jumper ant)                        | Myr p 1;                    |       | C | X70256           |
|   | Myr p 2;                    |       | C | S81785           |
| Solenopsis geminata<br>(tropical fire ant)                          | Sol g 2;                    |       |   | DR Hoffman       |
|   | Sol g 4;                    |       |   | DR Hoffman       |
| Solenopsis invicta<br>(fire ant)                                    | Sol i 2;                    | 13    | C | 110,111          |
|   | Sol i 3;                    | 24    | C | 110              |
|   | Sol i 4;                    | 13    | C | 110              |
| Solenopsis saevissima<br>(brazilian fire ant)                       | Sol s 2;                    |       |   | DR Hoffman       |
| H. Foods  |                             |       |   |                  |
| Gadus callarias<br>(cod)  | Gad c 1; allergen M         | 12    | C | 112,113          |
| Salmo salar<br>(Atlantic salmon)                                    | Sal s 1; parvalbumin        | 12    | C | X97824<br>X97825 |
| Bos domesticus<br>(domestic cattle)<br>(milk)<br>(see also animals) | Bos d 4; alpha-lactalbumin  | 14.2  | C | M18780           |
|   | Bos d 5; beta-lactoglobulin | 18.3  | C | X14712           |
|   | Bos d 6; serum albumin      | 67    | C | M73993           |
|   | Bos d 7; immunoglobulin     | 160   |   | 77               |
|   | Bos d 8; caseins            | 20-30 |   | 77               |
| Gallus domesticus<br>(chicken)                                      | Gal d 1; ovomucoid          | 28    | C | 114,115          |
|   | Gal d 2; ovalbumin          | 44    | C | 114,115          |
|   | Gal d 3; conalbumin (Ag22)  | 78    | C | 114,115          |
|   | Gal d 4; lysozyme           | 14    | C | 114,115          |
|   | Gal d 5; serum albumin      | 69    | C | X60688           |
| Metapenaeus ensis<br>(shrimp)                                       | Met e 1; tropomyosin        |       | C | U08008           |
| Penaeus aztecus<br>(shrimp)   | Pen a 1; tropomyosin        | 36    | P | 116              |



|                                      |   |             |   |               |
|--------------------------------------|---|-------------|---|---------------|
| Sinapis alba<br>(yellow mustard)     | Sin a 1; 2S albumin                                 | 14          | C | 120           |
| Glycine max<br>(soybean)             | Gly m 1.0101; HPS                                   | 7.5         | P | 121           |
|                                      | Gly m 1.0102; HPS                                   | 7           | P | 121           |
|                                      | Gly m 2   | 8           | P | A57106        |
|                                      | Gly m 3; profilin                                   | 14          | C | AJ223982      |
| Arachis hypogaea<br>(Peanut)         | Ara h 1; vicilin                                    | 63.5        | C | L34402        |
|                                      | Ara h 2; conglutin                                  | 17          | C | L77197        |
|                                      | Ara h 3; glycinin                                   | 60          | C | AF093541      |
|                                      | Ara h 4; glycinin                                   | 37          | C | AF086821      |
|                                      | Ara h 5; profilin                                   | 15          | C | AF059616      |
|                                      | Ara h 6; conglutin homolog                          | 15          | C | AF092846      |
|                                      | Ara h 7; conglutin homolog                          | 15          | C | AF091737      |
| Actinidia chinensis<br>(kiwi)        | Act c 1; cysteine protease                          | 30          | P | P00785        |
| Solanum tuberosum<br>(potato)        | Sola t 1; patatin                                   | 43          | P | P15476        |
| Bertholletia excelsa<br>(Brazil nut) | Ber e 1; 2S albumin                                 | 9           | C | P04403,M17146 |
| Juglans regia<br>(English walnut)    | Jug r 1; 2S albumin                                 |             | C | U66866        |
|                                      | Jug r 2; vicilin                                    | 44          | C | AF066055      |
| Ricinus communis<br>(Castor bean)    | Ric c 1; 2S albumin                                 |             | C | P01089        |
| I. Others                            |   |             |   |               |
| Anisakis simplex<br>(nematode)       | Ani s 1;  | 24          | P | A59069        |
|                                      | Ani s 2; paramyosin                                 | 97          | C | AF173004      |
| Ascaris suum<br>(worm)               | Asc s 1;  | 10          | P | 122           |
| Den n<br>(red coral)                 | Den n 1;  |             |   | Onizuka, p.c. |
| Hevea brasiliensis<br>(rubber)       | Hev b 1; elongation factor                          | 58          | P | 123,124       |
|                                      | Hev b 2; ( 1,3-glucanase                            | 34/36       | C | 125           |
|                                      | Hev b 3   | 24          | P | 126,127       |
|                                      | Hev b 4; component of<br>microhelix protein complex | 100/110/115 | P | 128           |
|                                      | Hev b 5   | 16          | C | U42640        |
|                                      | Hev b 6.01 hevein precursor                         | 20          | C | M36986/p02877 |
|                                      | Hev b 6.02 hevein                                   | 5           | C | M36986/p02877 |



|                                 |    |   |                       |
|---------------------------------|----|---|-----------------------|
| Hev b 6.03 C-terminal fragment  | 14 | C | M36986/p02877         |
| Hev b 7; patatin homologue      | 46 | C | U80598                |
| Hev b 8; profilin               | 14 | C | Y15042                |
| Hev b 9; enolase                | 51 | C | AJ132580/<br>AJ132581 |
| Hev b 10; Mn-superoxide dismut. | 26 | C | AJ249148              |

*Ctenocephalides felis felis*  
(cat flea)

|              |    |   |          |
|--------------|----|---|----------|
| Cte f 1;     |    |   |          |
| Cte f 2; M1b | 27 | C | AF231352 |

*Homo sapiens*

|                                |       |   |        |
|--------------------------------|-------|---|--------|
| (human autoallergens) Hom s 1; | 73*   | C | Y14314 |
| Hom s 2;                       | 10.3* | C | X80909 |
| Hom s 3;                       | 20.1* | C | X89985 |
| Hom s 4;                       | 36*   | C | Y17711 |
| Hom s 5;                       | 42.6* | C | P02538 |

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ATTORNEY DOCKET NUMBER: 2002834-0043 (CIP4)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Appellant: Bannon, et al. Examiner: Huynh, P.  
Serial No.: 09/141,220 Art Unit: 1644  
Filed: August 27, 1998  
For: METHODS AND REAGENTS FOR DECREASING CLINICAL REACTIONS  
TO ALLERGY

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Sir:


**TRANSMITTAL LETTER**

Enclosed herewith are the following:

1. Amended Appeal Brief Under 37 C.F.R. § 1.192 (45 pp.) in triplicate, including
  - a) Attachment I, Claims Pending (5 pp.);
  - b) Attachment II, Allergens listed in the "Official list of allergens" maintained by the IUIS Allergen Nomenclature Subcommittee (23 pp);
2. Petition for Extension of Time (1 month) (1 pg.);
3. Check in the amount of \$55.00 for Petition (small entity);
4. Statement of Limited Recognition Under 37 C.F.R. § 10.9(b) (1 pg.); and
5. Return postcard.

Please charge any other fees that may be associated with this matter, or credit any overpayments, to our Deposit Account No. 03-1721.

Respectfully submitted,

 11/19/04  
\_\_\_\_\_  
Charles E. Lyon, D.Phil.  
Limited Recognition Under 37 C.F.R. § 10.9(b)

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